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New Nouveau
Brunswick

Natural Resources and Energy
Minerals and Energy

Mineral Resource Report

New Brunswick's Mineral Industry *1999*

Edited by
Barbara M.W. Carroll

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New Nouveau
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2000

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SUMMARY

The Minerals and Energy Division of the New Brunswick Department of Natural Resources and Energy manages the mineral resources owned by the Crown. Responsibilities include conducting basic geoscientific studies, maintaining scientific and technical data to aid mineral exploration, developing mineral management policies, issuing licences and leases, administering acts and regulations related to minerals and mining, and monitoring mining activities. Staff geologists and engineers work with other government departments, companies, and organizations on matters related to forestry, environment, and construction. The division published approximately 45 maps and 30 reports in 1999.

The Recorder received 107 mineral exploration reports of work during 1999. Prospectors, and exploration and mining companies recorded 1771 claims, mainly in search of zinc, lead, copper, and gold. The focus of exploration in the Bathurst Mining Camp was base metals; outside the camp, porphyry copper/skarn and manto-style mineralization were of interest. In 1999, multiparameter airborne geophysical and stream-sediment surveys were carried out for Phase III of the Restigouche Project. In southern New Brunswick, platinum/palladium, nickel/cobalt/copper, gold, antimony, base metals, and potash were the focus of exploration. In addition, there was interest in the Province's limestone, aggregate, dimension stone, silica, and peat resources.

During the year, there were 2 producing metal mines and 37 producing nonmetal mines; one company was involved in coal production. Operations remained suspended at the Caribou and Restigouche mines (CanZinco Ltd.), the Murray Brook mine (Murray Brook Resources Inc.), the Lake George mine (APOCAN Inc.), and the Mount Pleasant mine (Adex Mining Inc.).

The value of New Brunswick's mineral production for 1999 was $857 516 899, a slight decrease from the 1998 figure ($862 992 354). The value of production for metals and fuels decreased slightly while the value of nonmetal and structural material production increased by 2% and 11%, respectively. Compared to mineral production in other Canadian provinces, New Brunswick's production ranked first in zinc, lead, bismuth and peat; and second in antimony, potash and silver. New Brunswick is the only producer of marl.

SOMMAIRE

La Division des ressources minières et de l'énergie du ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick est chargée de la gestion des ressources minérales de la Couronne. Parmi les responsabilités de cette division, on note les levés géoscientifiques de base, le maintien à jour des données scientifiques et techniques servant à la prospection minière, l'élaboration de politiques de gestion minière, la délivrance de permis et de baux, l'administration des lois et des règlements relatifs aux minéraux et aux mines ainsi que le contrôle des activités minières. Les géologues et les ingénieurs de la Division travaillent en étroite collaboration avec les autres ministères ainsi qu'avec les représentants d'entreprises et d'organismes, sur les questions relatives à la foresterie, à l'environnement et à la construction. En 1999, la Division des ressources minières et de l'énergie a publié environ 45 cartes et 30 rapports.

En 1999, l'archiviste aux mines a reçu 107 rapports de travaux d'exploration minière. Les prospecteurs miniers ainsi que les sociétés d'exploration et les sociétés minières ont jalonné un total de 1771 claims, surtout pour la recherche de zinc, de plomb, de cuivre et d'or. La prospection dans le Camp de Bathurst a principalement été axée sur les métaux communs; à l'extérieur du Camp, on s'est intéressé au cuivre et aux skarns porphyriques ainsi qu'à une mineralisation en manto. En 1999, un levé géophysique aérien à paramètres multiples et un levé géochimique à éléments multiples effectuée pour la phase III du Projet Restigouche. Dans le sud du Nouveau-Brunswick, la prospection a été concentrée sur le palatine / palladium, le nickel / cobalt / cuivre, l'or, l'antimoine, les metaux communs et la potasse. On s'est également intéressé aux ressources en calcaire, en agrégats, en pierre de taille, en silice et en tourbe de la province.

En 1999, il y avait 2 mines productrices de métaux et 37 mines produisaient des métaux non métalliques, et l'on comptait une entreprise de production de charbon. Les activités aux mines Caribou et Restigouche (CanZinco Ltd.), à la mine Murray Brook (Murray Brook Resources Inc.), à la mine de Lake George (APOCAN Inc.) et à la mine de Mount Pleasant (Adex Mining Inc.) sont toujours suspendues.

La valeur de la production de minéraux au Nouveau-Brunswick se chiffrait en 1999 à 857 516 899$, ce qui représente une légère diminution par rapport à 1998 (962 992 354 $). La valeur de la production de métaux et de combustibles a diminué légèrement, alors que celle de la production de métalloïdes et de matériaux de construction a augmenté de 2 % et 11 %, respectivement. Par rapport aux autres provinces canadiennes, le Nouveau-Brunswick se classe premier pour la production de zinc, de plomb, de bismuth et de tourbe; et deuxième pour celle d'antimoine, de potasse et d'argent. Le Nouveau-Brunswick est le seul producteur de marne au Canada.

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CHAPTER 1.
GOVERNMENT ORGANIZATION AND PROGRAMS

MINERALS AND ENERGY DIVISION

Donald E. Barnett, Assistant Deputy Minister

The New Brunswick Department of Natural Resources and Energy is responsible for managing the province's mineral and energy resources. In addition, it is the provincial agency responsible for mineral and energy policy.

The Minerals and Energy Division manages mineral and energy exploration, mine development, mineral processing and mine reclamation. The division also promotes the mineral and energy resource potential of the province, encourages exploration and extraction and the efficient use of energy. The mission of the division is to "identify and manage mineral and energy resources and optimize their economic contribution while sustaining environmental quality."

The Mineral Policy released in December 1993 and the Energy Policy of December 1990 form the basis of government's commitment to the long-term management of minerals and energy resources and support for development of each sector in a manner to both increase and sustain the economic value for present and future generations, whilst ensuring protection of the environment.

In 1999, the Minerals and Energy Division initiated two major studies, "New Brunswick Mining Industry" and "Peat Policy Review." The internal review of programs by Geological Surveys Branch staff continued.

The alarming trend of decreasing mineral production, employment, government revenue and exploration expenditures were brought to the government's attention. Four key issues were identified for improving the viability of New Brunswick's mining industry: (1) Declining mineral exploration and declining reserves; (2) Research and development into advancing mineral technologies; (3) Government legislation, mineral and fiscal policy; (4) Declining access to land base.

The Executive Committee appointed a steering committee consisting of government official from the Department of Natural Resources and Energy (Rao Irrinki, chair; Sam McEwan and Garry MacEwen), Business New Brunswick (Jim Chandra) and Regional Development Corporation (Patricia MacKenzie). The steering committee contracted the services of Dr. George Miller of Industry Government Relations Group Inc. to prepare a report for government containing a strategy and recommendation for improving and expanding the viability of New Brunswick Mining Industry into the next millennium. Dr. Miller, assisted by Dallas Davis, will submit a report in 2000.

The last revision to the Crown Peat Resource Management Policy and Programs was approved by government in 1998. In April 1999, the Executive Council directed the Department of Natural Resources and Energy to form a steering committee to review provincial policies with respect to the peat mining industry, focusing on the following four key issues: (1) Allocation of rights to Crown peatlands;

(2) Royalty regime and competitiveness of the industry; (3) Promotion of value-added production and research and development; (4) Financial assistance to the industry.

A steering committee was formed with staff from Natural Resources and Energy (Rao Irrinki, chair; Jacques Thibault and Garry MacEwen); Business New Brunswick (Jim Chandra and Paul LeBouthillier); Environment and Local Government (Germaine Pataki-Thériault) and Regional Development Corporation (Patricia MacKenzie). The steering committee, along with input from senior management of Natural Resources and Energy and Business New Brunswick, has prepared a new policy document that is being reviewed by government.

The Geological Surveys Branch continued its review of Branch programs and prepared a report containing its mandate, activities, partnerships and client needs. The results were presented to senior management of the department.

The Restigouche Project, begun in 1997 (Phase I) to evaluate the mineral potential in part of Restigouche County, continued in 1998 with Phase II, the assessment of results from Phase I geochemical and airborne geophysical surveys. Phase I ($540 000) and Phase II ($50 000) were funded by the Province. Following the completion of the evaluation report in 1999, a proposal for funding of Phase III was submitted to the Regional Development Corporation in 1999 and funding of $500 000 was received (Table 1). Phase III geophysical and geochemical surveys will be completed in 1999–2000 and the results will be released to the public in 2000.

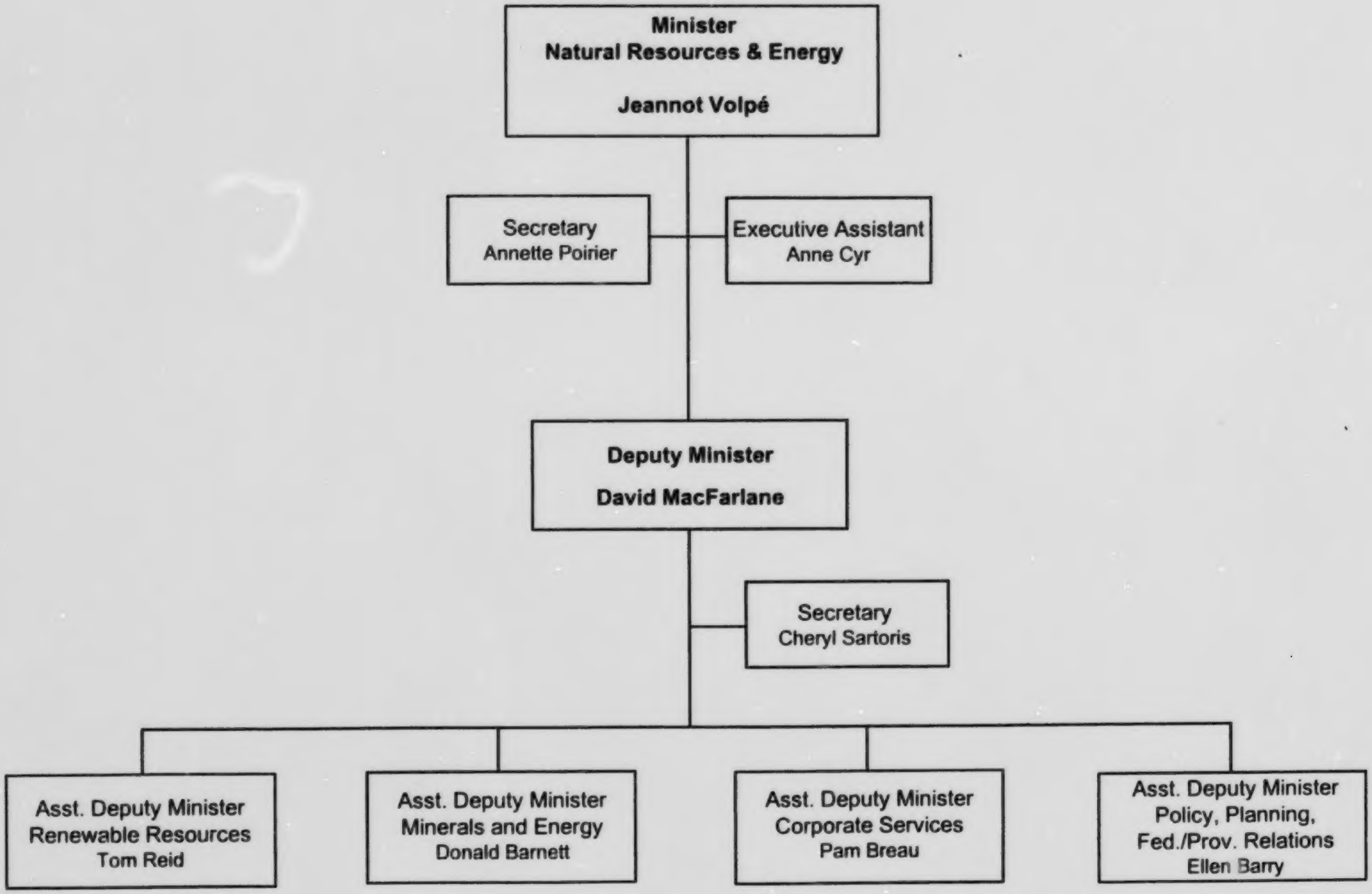
The New Brunswick Exploration Assistance Program (NBEAP), and Mineral Exploration Stimulation Program (MESP) continued in 1999 with a budget of $350 000 and $40 000, respectively.

The Minerals and Energy Division (Figure 1a to 1d) consists of two branches, Geological Surveys and Mines and Energy. In 1999, based on the internal review of programs, the Geological Surveys Branch made a few organizational changes (Figure 1c)

The 1999–2000 expenditures from the Division's A-base budget, from other provincial funds, and from Federal/Provincial agreements are summarized in Table 1 and Figure 2. Scientific, technical, administrative, and casual personnel employed by the Province in support of its mineral resource totalled 56 for 1999–2000.

Clientele of the Minerals and Energy Division are primarily mineral and energy resource companies, consultants, and associations. As well, many government departments and agencies and other resource-related industries utilize the geoscientific information generated by staff. In addition, staff provided direct advice into many government decisions on minerals and energy production and use at interprovincial and national levels. The Division continues to subscribe to the objective of providing quality service to all clients, delivered in an efficient and cost-effective manner.

Editor's Note: Projects commonly consist of a number of phases that are carried out by staff from different sections and branches of the Division. In order to find all the information on particular projects mentioned in this chapter, please refer to the index; the list of references for publications completed in 1999 is at the end of Chapter 1.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Pam Breau
Asst. Deputy Minister
Policy, Planning,
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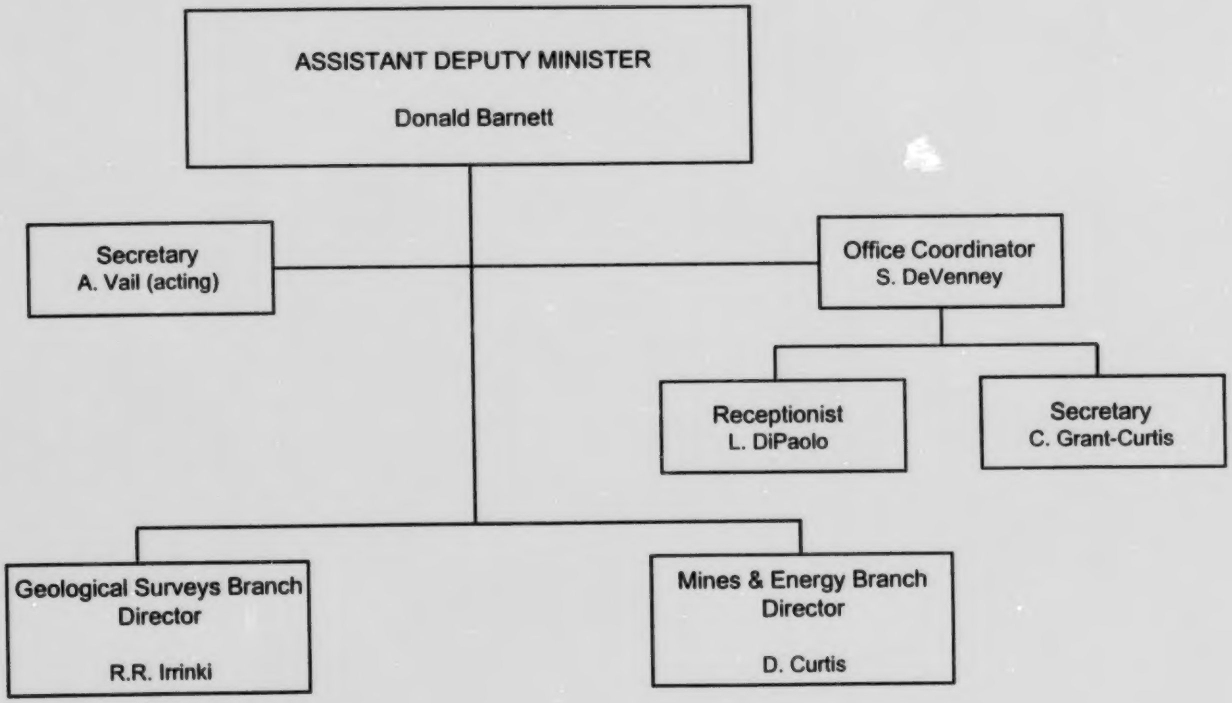
Ellen Barry

Figure 1a. Organization chart for the New Brunswick Department of Natural Resources and Energy (December, 1999).

Minerals and Energy Division


ASSISTANT DEPUTY MINISTER
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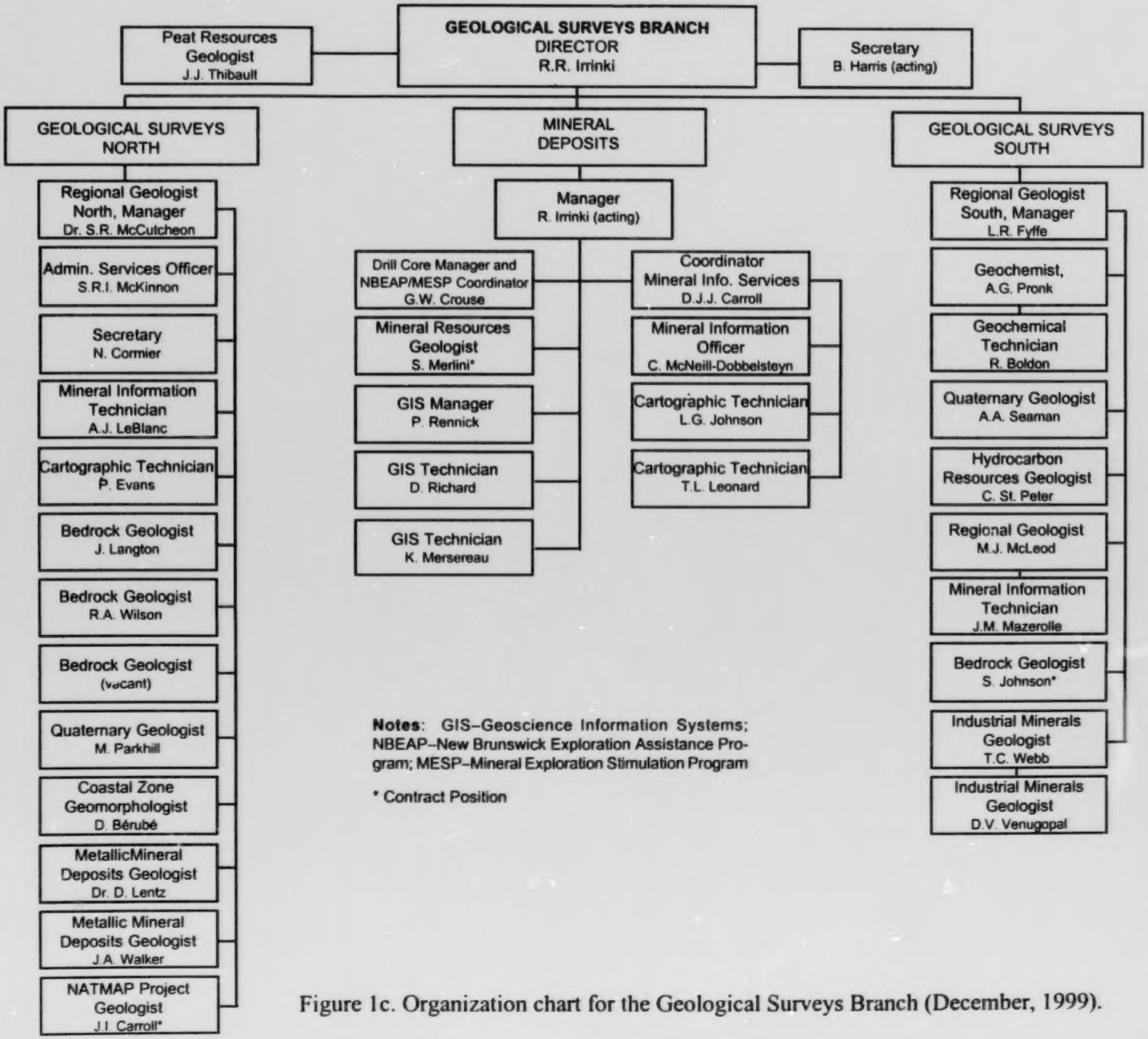
Receptionist
L. DiPaolo
Secretary
C. Grant-Curtis
Geological Surveys Branch
Director
R.R. Irrinki
Mines & Energy Branch
Director
D. Curtis

Figure 1b. Organization chart for the Minerals and Energy Division (December, 1999).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Mineral Information Officer
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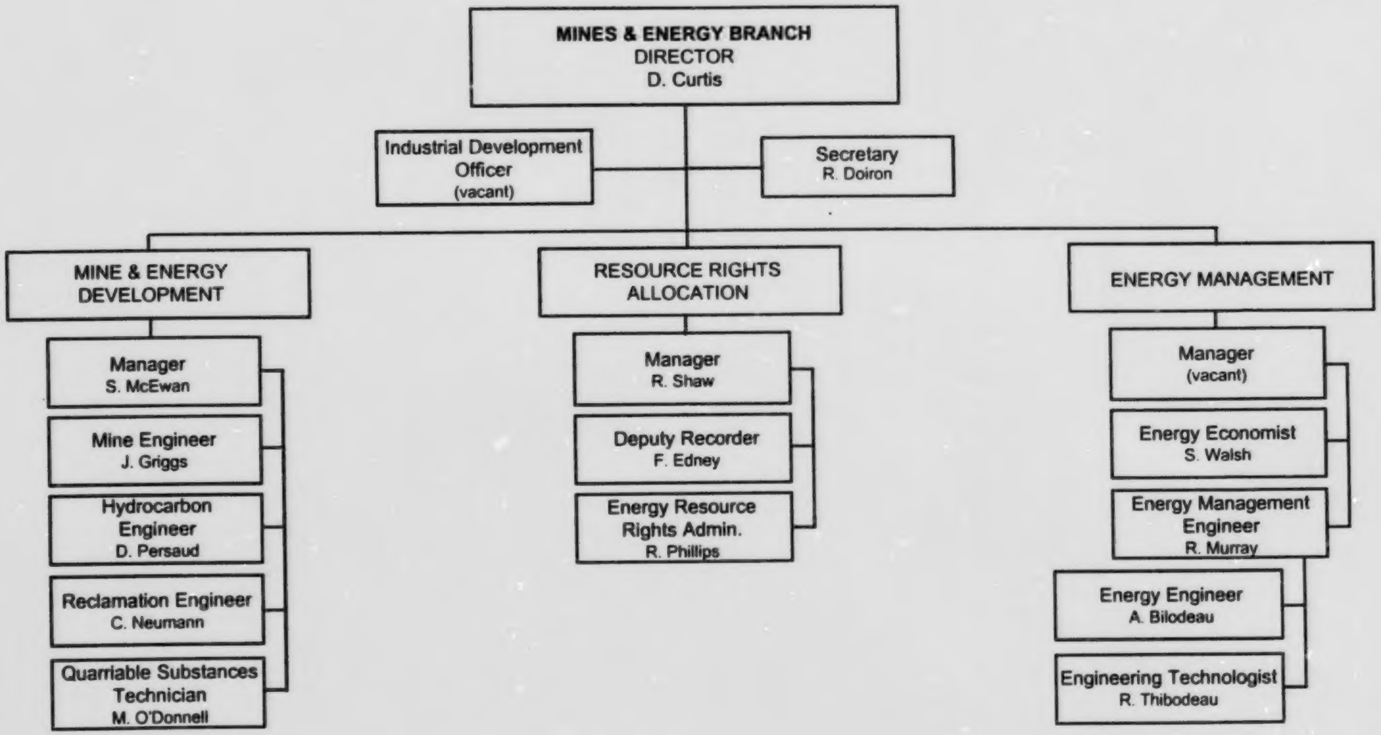
Mineral Information Technician
J.M. Mazerolle
Bedrock Geologist
S. Johnson*
Industrial Minerals Geologist
T.C. Webb
Industrial Minerals Geologist
D.V. Venugopal

Notes: GIS–Geoscience Information Systems; NBEAP–New Brunswick Exploration Assistance Program; MESP–Mineral Exploration Stimulation Program

* Contract Position

Figure 1c. Organization chart for the Geological Surveys Branch (December, 1999).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R. Murray
Energy Engineer
A. Bilodeau
Engineering Technologist
R. Thibodeau

Figure 1d. Organization chart for the Mines and Energy Branch (December, 1999).

Geological Surveys Branch

Rao R. Irrinki, Director

The Geological Surveys Branch is responsible for building and maintaining a comprehensive geoscience database for the province and using it to assist mineral exploration and development, as well as to advise government and the public regarding land use. The branch has a staff of 34 and 2 regional offices, one in Bathurst and the other in Sussex. The Regional Offices provide direct contact with the mineral industry based in northern and southern New Brunswick, respectively. The major activities of the branch are geological mapping, mineral deposit studies and inventory, geophysical and geochemical surveys, management of exploration assistance programs, and distribution and maintenance of geoscience information. The specific responsibilities of the branch are: (a) to map and publish data on the bedrock and surficial geology of New Brunswick; (b) to maintain an up-to-date inventory of mineral and energy resources of New Brunswick. These resources include metallic minerals such as base metals, gold, tin and nickel; nonmetallic or industrial minerals such as potash, gypsum, limestone and peat; and energy resources such as oil and natural gas, bituminous shale and coal; (c) to assist the mineral and energy industry in its search for mineral and energy deposits by developing exploration models, identifying areas for exploration and development and providing a geoscience knowledge base; (d) to map coastal geomorphology and investigate environmental sensitivities of the coastline; (e) to review and process all applications for peat exploration licences and peat leases under the *Quarriable Substances Act*; (f) to manage drill core, exploration assistance programs and mineral exploration reports of work; (g) to computerize and maintain geoscience and mineral data by using the Geoscience Information System (GSIS); (h) to distribute geoscience (mineral) information and publications; to organize public information sessions related to the mineral and energy industry; promotion and public awareness of geoscience and the mineral and energy industry; (i) to provide expert advice and consultation on land use planning and environmental issues.

Table 1. Minerals and Energy Division Expenditures, 1999–2000

Provincial	
Mines and Energy Branch	$2 995 408.28
Geological Surveys Branch	2 013 121.22
Mineral Exploration Stimulation Program	36 407.50
"New Brunswick Mining Industry" study	40 000.00
Total	**$5 084 937.00**
Province of New Brunswick (RDC-managed Economic Development Fund)	
Airborne Geophysical Survey—Restigouche	492 674.81
New Brunswick Exploration Assistance Program	329 953.09
"New Brunswick Mining Industry" study	40 000.00
Province of New Brunswick (RDC capital budget)	
Drill Core Program	21 761.26
Province of New Brunswick (Human Resources)	
Drill Core Program	23 624.93
Total	**$918 014.09**

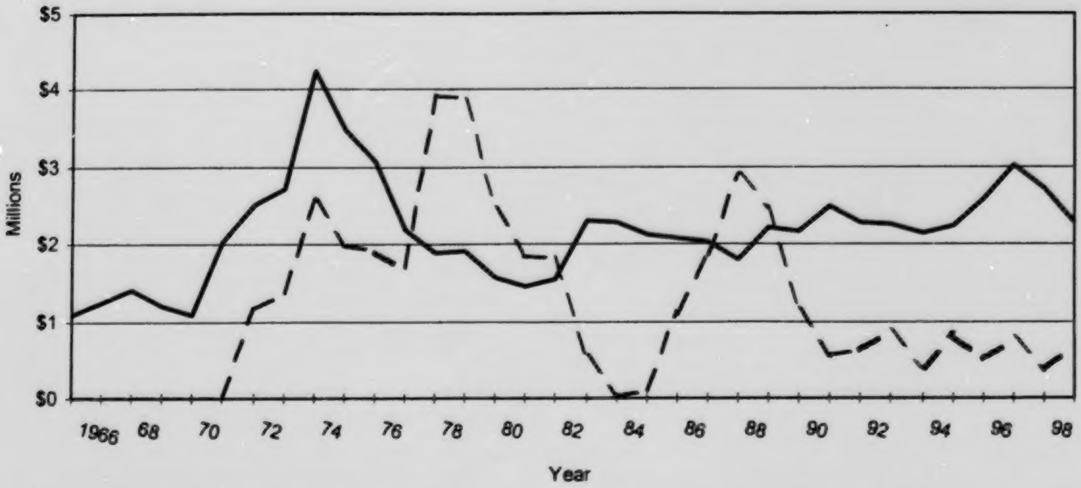


Figure 2. Minerals and Energy Division expenditures, 1965 to 1999, excluding those of Energy Branch. Legend: ——— Department A-base; - - - - - Federal/Provincial/other funding. ($1986 = 100)

The branch's ordinary budget for 1999–2000 was $2 199 400. The branch also received $500 000 from the Regional Development Corporation's (RDC) provincial funding for carrying out Phase III of the Restigouche Geophysical and Geochemical Surveys, and $350 000 RDC provincial funding for the New Brunswick Exploration Assistance Program, $25 000 from RDC's capital budget for the Drill Core Program, and approximately $24 000 funding from Human Resources New Brunswick. Actual expenditures are shown in Table 1. The branch has three sections, namely Geological Surveys North, Geological Surveys South and Mineral Information Services (Figure 1c). The Peat Resources Geologist reports to the Director.

The review of Geological Surveys Branch programs was initiated in 1998, and completed in 1999. The review was carried out by eight working groups guided by a Management Committee consisting of Rao Irrinki, Steve McCutcheon, Les Fyffe and Malcolm McLeod. The Bedrock Mapping group, chaired by Reginald Wilson, prepared a 31-page report; Terrain Sciences group, chaired by Mike Parkhill, prepared a 51-page report; Metallic Mineral Deposits group, chaired by David Lentz, prepared a 29-page report; Non-Metallic Minerals group, chaired by Jacques Thibault, prepared a 43-page report; Hydrocarbon Resources group, chaired by Clinton St. Peter, prepared a 29-page report; Geoscience Information Management group, chaired by Paul Renick, prepared a 26-page report; Mineral Information Services group, chaired by Don Carroll, prepared a 72-page report, and Resources Allocation group, chaired by Ron Shaw, prepared a 7-page report. The Management Committee chaired by Rao Irrinki prepared the 22-page executive summary. Les Fyffe critically reviewed the eight working group reports and the executive summary, and editing the overall report entitled "The Geological Surveys Branch Program Review."

PEAT (Jacques Thibault) The Province of New Brunswick is the principal peat producing area of Canada with about 35% of the national output. In New Brunswick, peat is defined as a quarriable substance and belongs to the landowner. About 70% of potentially commercial peatlands occur on Crown lands, which explains why the provincial government plays a major role in the administration of that resource. The current focus of the province's peat development strategy is on resource allocation, conservation of representative natural peatlands, and restoration of abandoned commercial peat operations.

Conferences / Workshops Rao Irrinki gave a presentation at the Division's Review of Activities. He also attended the Annual International Convention and Trade Show of the Prospectors and Developers Association of Canada and the Provincial Geologists' meeting that were held in Toronto in March; and the Mines and Energy Ministers' Conference held in Charlottetown in September.

In May, Jacques Thibault attended the 1999 International Conference on Ecology and Restoration of Salt Marshes held at the Irving Eco-Centre in Bouctouche, New Brunswick. Jacques also attended a one-day workshop on rare peatland plant identification given by Mr. Hal Hinds, at the University of New Brunswick in Fredericton. In November, Jacques gave a short course on the many facets of peat and peatlands at the Collège communautaire du Nouveau-Brunswick, Grand-Sault, New Brunswick.

Committees Rao Irrinki represented the Minerals and Energy Division on the Provincial Geologists' Committee, National Geological Surveys Committee, and Interdepartmental Committee on Minerals and Energy Issues. He was also a member and co-chair of the coordinating committee of the Memorandum of Understanding between the New Brunswick Geological Surveys Branch and the Geological Survey of Canada.

Rao Irrinki chaired the steering committee that is reviewing the status of the "New Brunswick Mining Industry" and "Review of Provincial Policies with Respect to the Peat-Mining Industry." Rao Irrinki also participated as a member of the departmental focus group reviewing performance management and reviewed the "Minerals and Energy Division Linguistic Profile."

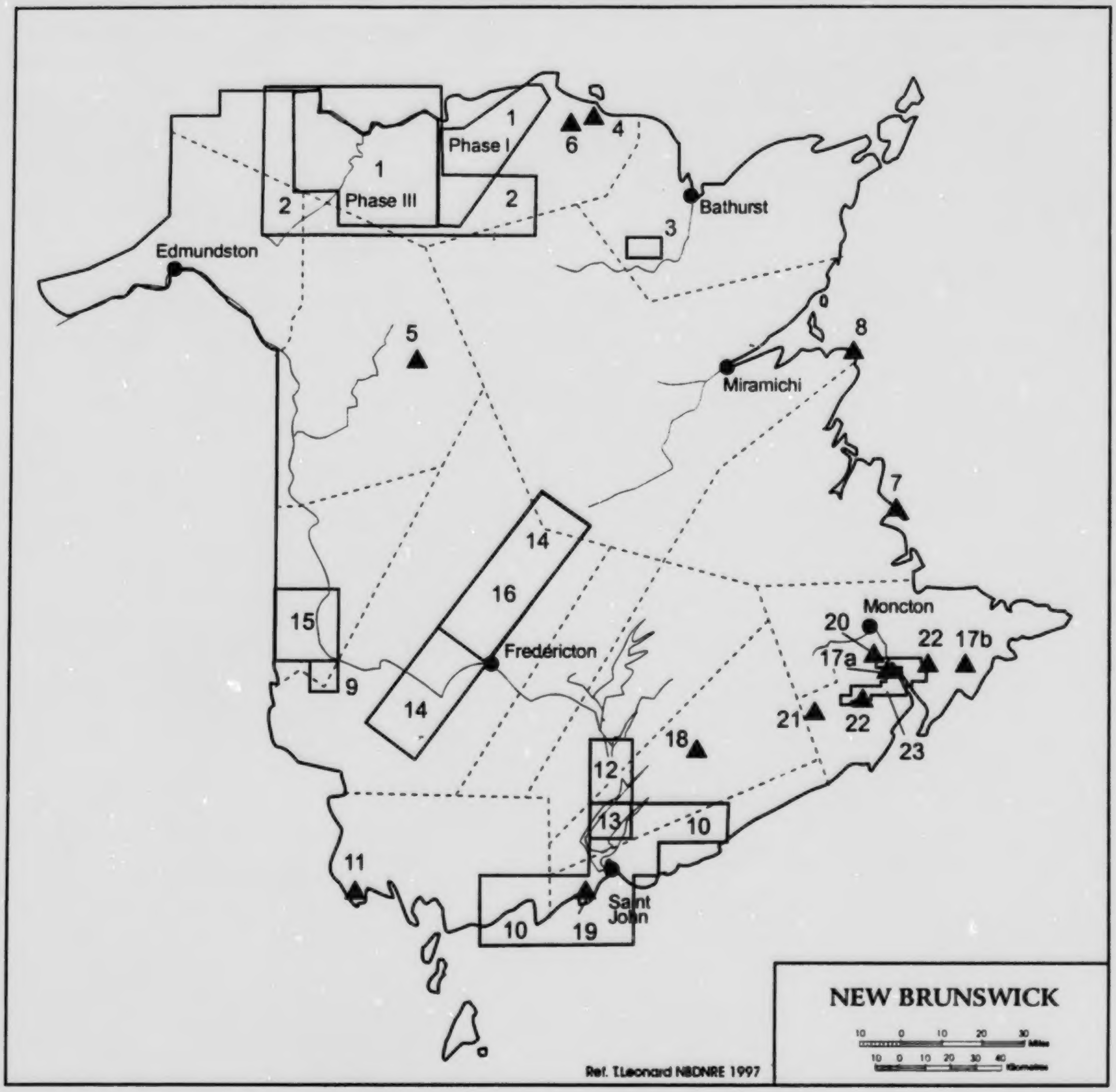
Jacques Thibault is a member of the Cranberry Task Team, which is chaired by the Department of Agriculture and Rural Development. The task team consists of personnel from key provincial departments and focuses on promoting the development of a cranberry industry in New Brunswick. Several development proposals are associated with peatlands. Jacques is also a member of an interdepartmental committee formed to review all provincial policies concerning the peat industry.

Geological Surveys North

The main purpose of the Bathurst Regional Office is to provide basic scientific data that will help the mineral industry find and/or develop new mineable resources (both metallic and industrial mineral, including peat) in the northern half of the Province. This is accomplished by:

- maintaining a complete and readily accessible copy of the geoscience database;
- gathering new geoscience data, integrating them with existing data and producing new geological maps and mineral potential models;
- providing map and report reproduction services as well as exploration work histories on mineral properties;
- providing claims and lease information as well as claims recording services;
- providing geological consultation services/advice to mineral industry clients;
- encouraging investment by promoting the mineral potential of northern New Brunswick through talks, poster displays and geoscientific publications on selected areas and/or topics;
- helping to maintain the diamond-drill-core library for northern New Brunswick at Madran.

The staff at the office includes Sharon McKinnon (Administrative Services Officer), Nicole Cormier (Secretary), André LeBlanc (Mineral Information Technician), Phillip Evans (Cartographic Technician),


1
Phase I
1
Phase III
2
2
6
4
3
Bathurst
Edmundston
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Miramichi
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Fredericton
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Saint John
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NEW BRUNSWICK
10 0 10 20 30 Miles
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Ref. T.Leonard NBDNRE 1997

Figure 3. Areas in which some Geological Surveys Branch and Mines and Energy Branch projects were conducted in 1999: (1) Restigouche Project area, Phase I and Phase III; (2) NATMAP's Geological Bridges Project, Transects 3 and 4; (3) core studies, Pabineau–QSR deposit; (4) drill-core studies, Nash Creek deposit; (5) mineral deposits studies, Sewell Brook–Mount Costigan; (6) mineral deposits studies, Benjamin River South; (7) orthophotogrammetric mapping, Bouctouche Dune; (8) post-glacial beach complex study, Point Escuminac; (9) bedrock mapping, Eel River; (10) bedrock mapping, southwestern part of Kingston Belt; (11) mineral deposits studies, St. Stephen Ni–Cu–Co; (12) bedrock mapping, Hampstead–Beulah area; (13) bedrock mapping, Long Reach area; (14) stratigraphic studies, Boiestown to York Mills area; (15) Quaternary geology and till geochemistry, Woodstock; (16) follow-up geochemistry, Burtts Corner to Boiestown; (17) follow-up geochemistry, a. Hillsborough, b. Aboushagan; (18) drill-core studies, Milstream potash deposit; (19) Lorneville pipeline; (20) Bull Creek #1 well; (21) Will DeMille #1 well; (22) core hole drilling, Memramcook–Rosevale area; (23) well drilling near Moncton.

Dr. Steven McCutcheon (Manager/Regional Geologist), Dr. David Lentz (Metallic Mineral Deposits Geologist), James Walker (Metallic Mineral Deposits Geologist), John Langton (Bedrock Geologist), Reginald Wilson (Bedrock Geologist), Michael Parkhill (Quaternary Geologist), Jacques Thibault (Peat Resources Geologist), Dominique Bérubé (Coastal Zone Geomorphologist), and Jeffrey Carroll (NATMAP Project Geologist). Janet-Lee Bannister, Marni Lynne Dickson, Emily Giberson, Robin Hills, Graham Price and Kenneth Clogg-Wright were hired as summer personnel.

EXTECH-II PROJECT This cooperative five-year venture focused on the Bathurst Mining Camp and involved the Geological Survey of Canada (GSC), the New Brunswick Department of Natural Resources and Energy, and private industry. The project ended in March, 1999 but some of the publications, including an Economic Geology Monograph and a Geophysical Atlas, were still in the writing/review process at that time. Consequently, significant effort was devoted by some staff members during the latter part of the year toward finalizing manuscripts for publication. The remaining EXTECH publications will be published in 2000 and 2001.

RESTIGOUCHE PROJECT The objective of the Restigouche Project (Figure 3: 1) is to help industry evaluate the potential for copper–gold deposits in porphyry–skarn systems in northwestern New Brunswick, including the Edmundston, Kedgwick and Tobique–Chaleur zones, which are part of the Gaspé Belt of adjacent Québec and Maine. This belt hosts porphyry copper deposits in Québec (e.g., Mines Gaspé and Patapedia) and contains inliers hosting base-metal deposits in Maine (e.g., Bald Mountain).

The Restigouche Project began in 1997 (Phase I) with a multi-parameter airborne geophysical survey and a multi-element stream-sediment survey over the northeastern parts of the Kedgwick and Tobique-Chaleur zones (see New Brunswick's Mineral Industry, 1998 [MRR 99-3] for description). Phase II involved evaluation of the results from the Phase I pilot project and was carried out by Kay Giggie in 1998. Phase II culminated with a report (Open File 99-9) indicating that further work was warranted in the northwestern part of the Province.

Consequently, in 1999 the airborne geophysical and stream geochemical surveys were extended northwestward to encompass the northeastern end of the Edmundston Zone, with the results to be released in 2000. Geoterrex-Dighem Ltd. conducted helicopter-borne magnetic, electromagnetic and radiometric surveys, totalling about 11 400 line kilometres, over parts of the Kedgwick (NTS 21 O/11W), Gounamitz River (21 O/12g and 12h), States Brook (21 O/13E) and Menneval (21 O/14) map areas, under the technical supervision of Frank Kiss of the Geological Survey of Canada. Precise Surveys Ltd. collected stream-sediment and water samples from the Gounamitz River (21 O/12) and States Brook (21 O/13) map areas. Becquerel Laboratories Ltd. performed the analyses, to National Geochemical Reconnaisance (NGR) standards, under the supervision of Toon Pronk (New Brunswick Geological Surveys Branch) and Peter Frisk (Geological Survey of Canada), respectively.

NATMAP PROJECT At the same time, bedrock mapping began in the Phase I area (Restigouche Project) as part of a federal–provincial NATMAP project called "Appalachian Foreland and St. Lawrence Platform Architectures in Quebec, New Brunswick and Newfoundland: Contribution to the Geological Bridges of Eastern Canada." This five-year project involves three provinces and is being carried out through the Geological Survey of Canada–Québec, under the direction of Denis Lavoie and Daniel Lebel (GSC-Québec), Steven McCutcheon (New Brunswick Geological Surveys Branch) and Stephen Colemann-Sadd (Geological Survey of Newfoundland). It comprises five transects across the Laurentian continental margin, two of which extend across the Gaspé Belt into northwestern New Brunswick. Transect 3 trends south along the Matapédia River to the vicinity of Saint-Quentin. Transect 4 trends northeasterly from the end of Transect 3 toward Dalhousie, across the end of Gaspé to Anticosti Island and beyond (Figure 3: 2).

BEDROCK MAPPING Projects were undertaken in transects 3 and 4 in 1999. Jeffrey Carroll, assisted by Kenneth Clogg-Wright, carried out 1:50 000 scale mapping under a NATMAP contract in the eastern half of the Kedgwick map area (NTS 21 O/11E). One of his objectives is to explain the highly anomalous nickel values in stream sediments from this area, which were found in the Phase I stream geochemical survey. Eventually his mapping will encompass four map areas in Transect 3 (NTS 21 O/11, 21 O/12, 21 O/13 and 21 O/14). Reginald Wilson and John Langton, assisted by Graham Price, carried out bedrock mapping at 1:20 000 scale in parts of the Atholville and Charlo map areas (NTS 21 O/15a, 21 O/15b and 21 O/16d) under A-base funding. Ultimately, they will focus on three map areas in Transect 4 (NTS 21 O/10, 21 O/15 and 21 O/16).

REGOLITH MAPPING AND SAMPLING A project, at 1:50 000 scale, was begun in 1999 in the Kedgwick map area (NTS 21 O/11) by Michael Parkhill and Toon Pronk assisted by Rex Boldon. A total of 140 till samples were collected. This is follow-up work to the National Geochemical Reconnaissance survey in the same area and will continue in the Kedgwick and Menneval (NTS 21 O/11 and 21 O/14) map areas over the course of the 2000–2001 field seasons. Marni Lynne Dickson and Michael Parkhill continued a project in the Charlo–Popelogan area (NTS 21 O/15 and 21 O/16). Mapping was completed and a total of 70 till samples were collected to finish the fieldwork component of Marni Lynne's M.Sc. thesis at the University of New Brunswick.

MINERAL DEPOSIT STUDIES James Walker, assisted by Janet-Lee Bannister, continued to field check occurrences and enter the data into the Mineral Occurrence Database (MOD). He finished his contributions on the twenty deposits that will appear in the EXTECH Geophysical Atlas, and he logged and sampled cores from the Pabineau-QSR and Nash Creek deposits (Figure 3: 3 and 4). In addition, he continued to work part time on deposits in the Sewell Brook–Mount Costigan area of the Tobique–Chaleur zone (Figure 3: 5) for his M.Sc. thesis at the University of New Brunswick.

David Lentz continued gathering data and preparing papers for publication related to lithogeochemical characterization of deposits in the Bathurst Mining Camp. He also sampled three intrusions in the Gaspé Belt for U–Pb isotopic dating, to provide a chronological framework for studies on potential porphyry-copper systems in the belt. Under David's supervision, Kirsten McLaughlin continued her project on the Benjamin River South porphyry-copper deposit (Figure 3: 6), for her Honours thesis at the University of New Brunswick. Chris MacDonald also began a project for David on the Woodstock porphyry-copper deposit as part of his M.Sc. thesis at the University of New Brunswick.

David will be leaving the Geological Surveys Branch as of the beginning of January, 2000 to take on the role of professor of Economic Geology at the University of New Brunswick. We wish him well and expect to maintain a close working relationship with him and his students in the future.

COASTAL ZONE Dominique Bérubé carried out work with both restoration and research components. He completed the orthophotogrammetric mapping of the Bouctouche Dune (Figure 3: 7). Aerial photos from 1945, 1973 and 1996 were digitized at high resolution (CARIS) to analyze coastline (dune) and shoreline (beach) changes. Léa Olsen, under Dominique's supervision, completed a study of a post-glacial beach complex at Point Escuminac, for her honours thesis at the University of Moncton (Figure

3: 8). Dominique continued to monitor erosional/depositional changes (beach profiles) at Youghall Beach, Bouctouche Dune, L'Aboiteau Beach and Long Pond Beach.

Conferences / Field Workshops / Courses The Bathurst staff promoted the geology and mineral potential of northern New Brunswick by displaying posters and giving oral presentations at a number of conferences. In January, John Langton attended and helped man the Geological Surveys Branch display at the Annual Cordilleran Exploration Roundup in Vancouver. In February, John Langton, Michael Parkhill, and Reg Wilson attended the Colloquium and Annual General Meeting of the Atlantic Geoscience Society in Amherst. In February, Steve McCutcheon attended the NATMAP Annual Review of Activities in Ottawa, and in March, he attended and helped man the Geological Surveys Branch display at the Annual International Convention and Trade Exposition of the Prospectors and Developers Association of Canada in Toronto. In April, Michael Parkhill attended the 19th International Geochemical Exploration Symposium, Workshop and Field Trip in Vancouver, and Dominique Bérubé participated to a workshop entitled "Natural Disasters in the Coastal Zone and their Mitigation", in Sackville. In May, Steve McCutcheon and David Lentz attended the Geological Association of Canada–Mineralogical Association of Canada Joint Annual Meeting in Sudbury, and Dominique Bérubé attended the "Salt Marsh Ecology and Rehabilitation Conference" in Bouctouche. In June, Reg Wilson helped lead the New Brunswick Prospectors and Developers Association annual field trip in the Heath Steele area. In September, Dominique Bérubé participated to a workshop entitled "Remote Sensing Technologies for Coastal Zone Mapping" in Fredericton. In late September, Jeff Carroll, John Langton, David Lentz, Steve McCutcheon and Michael Parkhill attended a NATMAP field trip in northern New Brunswick and southern Gaspé, followed by a one-day workshop with GSC personnel to discuss possible future projects. In November, several staff members of the Bathurst office presented talks and/or posters at the New Brunswick Minerals and Energy Division's Annual Review of Activities. Abstracts for oral presentations and posters at these conferences are listed at the end of this chapter.

Publications Both internal and external publications were prepared by the Bathurst staff. Of the seven papers in "Current Research 1998" (Mineral Resource Report 99-4), three were contributed by geologists from the Bathurst office. D. Lentz, J. Langton and R. Wilson authored or co-authored papers or abstracts in external publications; D. Lentz and S. McCutcheon provided one or more critical reviews of manuscripts for geoscience journals.

Committees In 1999, David Lentz sat on both the New Brunswick Exploration Assistance Program (NBEAP) and Mineral Exploration Stimulation Program (MESP) committees. Steve McCutcheon was a member of the MESP Committee, became a member of the Continued Competency Assurance Committee of the Association of Professional Engineers and Geoscientists of New Brunswick (APEGNB), was an Associate Editor of Exploration and Mining Geology, and was Finance Chair of the Geological Association of Canada. Michael Parkhill, James Walker and Reg Wilson were councillors of the Atlantic Geoscience Society (AGS) and Reg also became a member of the Legislation Committee of the APEGNB. Dominique Bérubé was a member of the New Brunswick Coastal Zone Committee. All members of the office were heavily involved in the review of the Geological Surveys Branch's programs and several headed up specific subcommittes (Lentz, Parkhill, Thibault and Wilson).

Other Activities During the year, the staff provided geological consulting and/or exploration support services to geologists and prospectors, both in the office and the field. Visits were made to mineral properties held by the following companies: Eastmain Resources Inc., Log House Construction Ltd., Noranda Inc. and Slam Exploration Ltd.

Field trips, office tours and class presentations were given to middle school and high school students by J. Walker, R. Wilson, and M. Parkhill. Staff also participated in the Job Shadowing and Youth Apprenticeship programs with students from Bathurst High School.

Geological Surveys South

Geological Surveys South staff located at the Hugh John Flemming Forestry Centre in Fredericton consists of Les Fyffe (Manager), Clinton St. Peter (Hydrocarbon Resources Geologist), Allen Seaman (Quaternary Geologist), Toon Pronk (Geochemist), Rex Boldon (Geochemical Technician), Tim Webb (Industrial Minerals Geologist) and D.V. Venugopal (Industrial Minerals Geologist).

Staff at the Picadilly Road office in Sussex consisted of Malcolm McLeod (Regional Geologist), Susan Johnson (Bedrock Geologist) and Maurice Mazerolle (Engineering Technician). Heather Williams (student) and Ivi Turner (office assistant) were hired for the summer.

Geological mapping was carried out in York and Carleton counties, west-central New Brunswick by Les Fyffe who mapped the bedrock of the Eel River area (NTS 21 G/13h) at a scale of 1:20 000 (Figure 3: 9).

Sandra Barr of Acadia University was partially funded by the Department of Natural Resources while continuing her research and mapping in the southwestern part of the Kingston belt (part of NTS 21 G/8) (Figure 3: 10). Maps of the entire Kingston belt are presently being compiled at 1:20 000 scale (21 G/1c–1h; 21 G/2a,b,g,h; 21 G/8a,b,g,h; and 21 H/05d–5f). Samples collected from the Caledonia, Brookville, Kingston and Mascarene terranes are being radiometrically dated by Brent Miller at the University of North Carolina. Also, O. Gaskill of Acadia University (M.Sc. thesis supervised by S. Barr) was partially funded for a new project initiated to investigate the St. Stephen Ni–Cu–Co deposit (part of NTS 21 G/03) (Figure 3: 11).

SUSSEX REGIONAL OFFICE The Sussex Regional Office is an amalgamated facility that houses the Geological Surveys and District Forest Ranger staff. During 1999, the staff continued to provide ready access to government reports and maps, the drill-core facility, and technical equipment. Consultation services were provided throughout the year to the exploration community, to other government agencies and engineering firms, and to academic institutions. Other work included tasks associated with all aspects of claim staking and recording, and promotion of southern New Brunswick's mineral potential via regional-scale and site-specific field trips and oral presentations. The office is also a base from which some of the bedrock geological mapping projects were conducted.

Malcolm McLeod initiated a 1:20 000 scale bedrock mapping program to delineate the distribution of Silurian units in the Hampstead–Beulah area (parts of 21 G/9a, 9g and 9h) (Figure 3: 12). In conjunction with Steve McCutcheon, information on several of the most significant gold occurrences in the province were re-examined and generalized models for gold environments were established to enhance exploration activities.

Susan Johnson, assisted by Heather Williams during the summer, continued 1:20 000 scale mapping to unravel the stratigraphic and structural relationships in the Long Reach area (parts of 21 G/8g and 8h) (Figure 3: 13). In conjunction with Clinton St. Peter, work on the final report for the NATMAP Magdalen

Basin project continued. She also began preparing contributions to a new lexicon for stratigrahy in the Atlantic Provinces.

Maurice Mazerolle provided technical assistance in the preparation of geological maps, figures and diagrams for plates, presentations and publications. He also continued to compile diamond-drill hole and trench information in the southern part of the province with the aid of Ivi Turner, and oversaw reorganization of core at Sussex's core-storage facility.

CARBONIFEROUS GEOLOGICAL SURVEYS (Clinton St. Peter) Limited work continued on the study of Carboniferous geology of southeastern New Brunswick. This included collecting additional samples for spore dates, updating the associated palynological database and revising accompanying geological maps. The data and maps will be included in a report that is the Department's final commitment under the Canada/New Brunswick-sponsored NATMAP Maritimes Basin Project.

In the summer and autumn of 1999 a geological survey of the southwestern margin of the Carboniferous New Brunswick platform was undertaken. The study area comprised a narrow belt from Boiestown in the northeast to York Mills in the southwest (Figure 3: 14). The objectives of the work were: (1) to ascertain the stratigraphic section in areas which were previously poorly mapped or unmapped, (2) to sample all prospective beds for spores to determine the chronostratigraphy of the beds, (3) to examine and evaluate all structural features which may have a bearing on the tectonic history of the Platform margin and subjacent Marysville Subbasin, and (4) to assess the mineral and hydrocarbon potential of the Marysville Subbasin. A regional compilation geological map (Plate 2000-16) has been published showing highlights of the study.

QUATERNARY GEOLOGY (Allen Seaman) Gold mineralization at Poplar Mountain in the Fosterville (NTS 21 G/13) map area was identified by an earlier DNRE till geochemistry project. This mineralization is now known to be directly related to the Woodstock Fault as a result of detailed studies carried out by Freewest Resources Canada Inc. on its Golden Ridge property. As a consequence, field work planned for the Millville (NTS 21 J/04) and Coldstream (NTS 21 J/06) map areas for 1999 was deferred in favour of till sampling in the Woodstock (NTS 21 J/04) map area (Figure 3: 15), adjacent to the Fosterville map area and also traversed by the Woodstock Fault.

The objective of this till sampling project was to aid in assessing the mineral resource potential of the fault in the Woodstock area. Samples were collected based on the standard 2 km sample grid, with a slight modification. For the area adjacent to and east of the mapped position of the fault, samples were collected from all grid points, except for two lying within the Saint John River valley. However, for the western part of the area, samples were collected only from alternate grid points. In all, samples were collected from 114 sites.

GEOCHEMISTRY LABORATORY (Toon Pronk, Rex Boldon) During the summer of 1999, several areas were selected for follow-up geochemistry with till and stream-sediment samples. Follow-up of some Au and Cu anomalies from a previous National Geochemical Reconnaissance survey in the area between Burtts Corner and Boiestown (Figure 3: 16) did not indicate any significant trend or promising results. More thorough follow-up work took place in the Hillsborough and Aboushagan areas (Figure 3: 17a, b) of southeastern New Brunswick to test Carboniferous rocks against a model for copper and gold mineralization as proposed by Johnson and McLeod. Approximately 60 sites were sampled; soil parameters, landforms, and vegetation inventory were recorded. In cooperation with Mike Parkhill, till sampling was carried out in the east half of the Kedgwick map area (NTS 21 O/11E) of northwestern New Brunswick.

Rex Boldon provided field and laboratory assistance for several surficial mapping projects. He prepared all collected till samples for analysis and carried out grain-size analyses on till samples from surficial mapping in the Bathurst Mining Camp, Restigouche Project, and the Woodstock map area. Toon Pronk and Rex Boldon directed and did quality control on a stream-sediment and water geochemistry survey in the Restigouche area of northwestern New Brunswick (Gounamitz River and State Brook map areas, NTS 21 O/12 and 21 O/13). The surveys were conducted to the standards of the Geological Survey of Canada's National Geochemical Reconnaissance and will be published in 2000.

INDUSTRIAL MINERALS (Tim C. Webb and D.V. Venugopal) In 1999, the industrial minerals section of the Geological Surveys Branch focused on several geotechnical activities related to gypsum, selected clay deposits, magnesium, titanium and silica. In addition, the section dealt with an assortment of issues pertaining to the development of New Brunswick's nonmetallic mineral resources.

More specifically, work continued on a re-assessment of New Brunswick's gypsum resource. This involved compilation and updating of geotechnical and related historical information pertaining to the development potential of selected deposits. Several deposits were remapped and exploration models were established, leading to an improved understanding of the various geologic factors controlling deposit distribution. This initiative has resulted in the recognition of several areas with exploration potential for high-quality gypsum resources.

The province's silica resource was reviewed with special attention given to categorizing the resource, describing selected deposits, and providing preliminary exploration guidelines. Several new occurrences of arenaceous sandstone have been located in Carboniferous strata in southern and northeastern New Brunswick.

Drill core from the Millstream potash deposit (Figure 3:18), a few kilometres west of Sussex, was sampled and analysed for its magnesium content. Preliminary geological indications seem to support reasonable expectations that there is understudied potential for magnesium mineralization intimately associated with the extensive potash resource.

A comprehensive assessment of Precambrian limestone and dolomite deposits was published, completing a province-wide study of the province's limestone resources.

A study was initiated in consideration of the potential for kaolin and related clay deposits in parts of the province as well as investigations into the significance of titanium-bearing clastic, utramafic and mafic volcanic rocks in parts of northern and southern New Brunswick.

CONFERENCES / WORKSHOPS / FIELD WORKSHOPS Clint St. Peter attended the Atlantic Geoscience Society's Colloquium and Annual General Meeting in Amherst, Nova Scotia in February. Two sessions had a bearing on New Brunswick Carboniferous geology and resources: (1) Geology of the Maritimes Basin: a Session Dedicated to the Memory of Sir William Dawson, and (2) Offshore Petroleum Geology and Geological Resources.

Clint St. Peter attended the Canadian Association of Petroleum Landmen's prospect exchange in Calgary in April. The purpose of the trip was to view the proceedings and to assess the worthiness of the

Department participating in the prospect exchange in 2000. The Canadian Association of Petroleum Landmen initiated in 1997 an annual conference in Calgary Alberta with the objective of offering oil and natural gas companies, energy resource explorationists, and federal and provincial energy departments the opportunity of displaying oil and natural gas prospects or "plays" to prospective third parties and investors.

Malcolm McLeod attended the 67th Annual International Convention and Trade Exhibition of the Prospectors and Developers Association of Canada that was held in Toronto in March.

In June, Malcolm McLeod, Susan Johnson and Les Fyffe attended a field trip in Maine co-sponsored by the United States Geological Survey and the Maine Department of Conservation to establish cross-border correlation of major geological units. A comparable trip was hosted by the New Brunswick Geological Surveys' staff later in the summer.

Toon Pronk presented a paper on the status of geochemical databases in the province of New Brunswick at the annual Review of Activities. He also attended the biennial meeting of the Canadian Quaternary Association in Calgary, where he presented a poster on the glacial history of the Petitcodiac area.

Industrial Minerals Geologist, Tim Webb presented a paper entitled "Industrial rock and mineral developments and opportunities in New Brunswick" at the Minerals and Energy Division's 1999 Annual Review of Activities. This informative paper provided a synopsis of recent research initiatives and exploration activities pertaining to the nonmetallic part of New Brunswick's mineral industry. Also provided was a commentary focusing on overlooked and underrated industrial minerals resource development opportunities in the Province (e.g., aggregate export, and magnesium, sodium sulphate and natural stone resources).

PUBLICATIONS A paper on the stratigraphy of the Mascarene Basin co-authored by Les Fyffe (New Brunswick Geological Surveys Branch) and Ron Pickerill and Peter Stringer (University of New Brunswick) has been published in *Atlantic Geology*.Allen Seaman completed Open File releases of digital till geochemistry data for the Forest City (NTS 21 G/12) and Fosterville (NTS 21 G/13) map areas (Open File 99-7), and for the Millville (NTS 21 J/04) map area (Open File 99-10). A paper on the follow-up till geochemistry sampling in the Millville map area was published in the Division's "Current Research 1998" volume (Mineral Resource Report 99-4).

Tim Webb prepared an information circular entitled "Developing New Brunswick's stone resource: a down-to-earth approach" and a display focused on the province's industrial mineral potential and its related industry were prepared for the Annual Cordilleran Exploration Roundup 2000 in Vancouver, British Columbia and the annual International Convention and Trade Exhibition of the Prospectors and Developers Association Meeting in Toronto, Ontario.

An article on New Brunswick's dimension stone resources and a profile of the Province's stone industry was prepared and published in *Natural Stone in Canada*, a supplemental publication of the internationally distributed *Roc Maquina* magazine.

Final editorial comments were incorporated into a paper entitled "Industrial rock and mineral development and opportunities in New Brunswick." Focusing on the importance and high level of activity surrounding the development of the province's industrial rock and mineral resources, this paper is to be published in an upcoming special volume on *Industrial Minerals in Canada* by the Canadian Institute of Mining, Metallurgy and Petroleum. The following is an excerpt from the paper's abstract:

> "New Brunswick's varied geology is reflected not only by the diversity of industrial rock and mineral resources presently under development but also in several promising exploration and potential development opportunities. The Province is home to several industrial rock and mineral processing facilities, each with established technologies ensuring high-quality products and each with sufficient flexibility to supply customized products for various specialized niche markets. With the imminent availability of natural gas to parts of the Province, the prospects for additional value-added processing and re-examination of known, yet presently undeveloped deposits appear excellent. These variables coupled with New Brunswick's advantageous geographical location, highlighting tidewater access to global markets and within one day's trucking distance to a regional market of several million people, guarantee prompt delivery of high-quality products at competitive prices."

COMMITTEES Les Fyffe is on the committee of the Atlantic Geoscience Society that is preparing a book on the geology of the Maritimes to mark the 20th anniversary of the Society. The final draft is now being edited.

Toon Pronk ended his Secretary/Treasurer position with the Canadian Quaternary Association (CANQUA), a position he held for 10 years. He is the New Brunswick representative on the Canadian Geoscience Education Network.

Clint St. Peter is chairing the Accommodations Committee for the Atlantic Geoscience Society's Colloquium and Annual General Meeting to be held in Fredericton in February 2000.

OTHER ACTIVITIES Les Fyffe reviewed a number of papers submitted for publication in the special volume of Economic Geology that is being prepared on the EXTECH work in the Bathurst Mining Camp. Les Fyffe and Steve McCutcheon are compiling, in digital format, a new 1:500 000 scale geology map of New Brunswick.

Throughout the year, Toon Pronk visited classrooms when teachers made requests through the Geological Surveys Branch and the Innovators in the Schools Program. A total of 14 classes, from K to 8, mostly one but sometimes two classes at a time, in 7 different schools (approximately 400 students) were visited. Mostly grade 5 and 6 students learned about rocks and minerals, volcanoes, earthquakes, ice ages, soils, erosion, mining, and earth science in general. The presentation is adapted to fit the "Changes in the Land" earth science module in the science curriculum

Mineral Deposits

The Mineral Deposits Section consists of the Manager (vacant position), Don Carroll (Mineral Information Services Coordinator), Greg Crouse (Drill Core Manager, Exploration Support Services), Terry Leonard (Cartographic Technician), L. Gerard Johnson (Cartographic Technician), Carol McNeill-Dobbelsteyn (Geoscience Research and Planning Officer), Shasta Merlini (Mineral Resources Geologist), Ken Mersereau (Digitizing Technician), Paul Rennick (Database Manager), Diane Richard (GIS Operator). This Section is responsible for the New Brunswick Mineral Occurrence Database; Compilation and

Publication of"Available Mineral Properties in New Brunswick"; Drill Core Management and Exploration Support Programs; Computerization of Geoscience Data and GIS-related Projects; Mineral Information Services; and Special Projects. In the latter part of 1999, the industrial minerals staff (Tim Webb and D.V. Venugopal) were moved to the Geological Surveys South section.

NEW BRUNSWICK MINERAL OCCURRENCE DATABASE (Shasta Merlini) The New Brunswick Mineral Occurrence Database includes descriptions of metallic mineral occurrences in New Brunswick that range in size from small showings to operating mines. The data recorded include descriptions of the geological setting, geographic location, prospecting history, geochemical and geophysical surveys, trenches and drill holes, assays, and published reserves. Sources of information are listed and include the Division's published geological reports, maps, and unpublished file material, industry assessment reports, Geological Survey of Canada publications, scientific journal articles, and university theses.

Information for NTS map areas 21 H/9, 10, 11, 12, 13, 14, 15, and 16 has been updated. All coordinates are now located based on the Average Terrestrial System 1977. The New Brunswick Mineral Occurrence Database is updated on an ongoing basis for the entire province.

The database currently uses dBASE file format in a stand-alone DOS-driven program. Future plans may include upgrading to a Windows-based environment. The computerized database contained 802 mineral occurrences when it was first released by D. Rose and S. Johnson in 1990. The second release (April, 1993) included 1284 occurrences with extended information in the form of a separate text file for about one third of those occurrences. The November 1998 release had a total of 1385 mineral occurrences, including text files for the majority. In November 1999, the release included 1402 documented occurrences.

AVAILABLE MINERAL PROPERTIES IN NEW BRUNSWICK (Shasta Merlini) The New Brunswick Department of Natural Resources and Energy commonly receives requests for information on available mineral properties in New Brunswick. In addition, prospectors frequently ask if any companies are interested in acquiring properties. The Department, in cooperation with the New Brunswick Prospectors and Developers Association (PDAC), began to compile information on currently active New Brunswick mineral properties in late 1997 for a yearly publication called "Available Mineral Properties in New Brunswick" (Reference 130). The purpose of the report is to actively promote exploration in New Brunswick, encourage interaction within the exploration community, and attract new junior and major mining companies to the province. The publication is generally published once a year to be distributed at the Annual Cordilleran Exploration Roundup conference (January), the PDAC Annual International Convention and Trade Exhibition (March), and the New Brunswick Department of Natural Resources and Energy Annual Review of Activities (November).

Letters are sent out to all current claim holders to request information on their mineral properties. Prospectors and mining companies who would like to promote their properties submit the data to the Department. There is a one-page summary for each property along with a map showing the claim group(s) of interest, surrounding general geology, and any nearby significant mineral occurrences or mine sites. The properties are organized according to general deposit types. Indices are provided at the back to cross-reference property name, prospector/company, contact person, and NTS map area. A list of mineral occurrences and the "Directory of Goods and Services for the Exploration Industry in New Brunswick / Répertoire des produits et des services offerts à l'industrie de l'exploration minérale au Nouveau-Brunswick" (compiled by C. McNeill-Dobbelsteyn and B. Carroll) are included.

DRILL-CORE MANAGEMENT AND EXPLORATION SUPPORT SERVICES (Greg Crouse) The Geological Surveys Branch maintains drill-core storage facilities in Fredericton, Bathurst, and Sussex. The Bathurst facility, located approximately 30 km north of Bathurst at Madran, was built in the mid-1970s with funding from the Canada–New Brunswick General Development Agreement. The Sussex facility, located behind the Regional Office at Picadilly, was built in the 1980s from funding under the Canada–New Brunswick Mineral Development Agreement. The Fredericton core-storage facility was built as part of the Hugh John Flemming Forestry Centre in the late 1980s. All facilities are equipped with well lit viewing rooms and core saws. The facilities are well used by industry and government geologists.

The Geological Surveys Branch received approximately 42 000 m of core in 1999. Core that had been drilled by Miramichi Lumber Company and stored in Boiestown was turned over to DNRE by Bowater Pulp and Paper Canada Inc. and core that had been stored at Heath Steele was moved to Madran.

Mineral Exploration Stimulation Program (MESP) In 1988, the Geological Surveys Branch introduced the MESP for prospectors. Successful applicants to the program are awarded grants to help defray their prospecting costs. Eligible expenses for the program are analyses, mileage, trenching, geophysics, and geological consulting. Prospectors are not allowed to charge capital expenses or wages to the program. The recipient must provide the Program Coordinator with a sample location map, results of analyses, and receipts documenting expenses in order to receive the final installment of the grant. Applications are reviewed by a committee chaired by Greg Crouse. Members of the Committee in 1999 were M. McLeod, S. McCutcheon, Gary Woods and D. Lentz. They reviewed 35 applications for funding and approved 33. The MESP budget was $40 000 in 1999 and the largest grant was $1 500.

New Brunswick Exploration Assistance Program (NBEAP) This program, funded by the Canada–New Brunswick Cooperation Agreement on Economic Diversification, was introduced in November, 1994. The main objective of the program is to provide financial assistance to junior mining companies in order to increase the probability of finding economic reserves of mineral resources in New Brunswick. This program will provide up to 50% of the project cost to a maximum of $40 000. The minimum amount available per project is $20 000. The remaining costs of the project will be borne by the applicant, either in cash or "in-kind" work.

A provincially funded NBEAP program was introduced in 1998 with the same objectives and guidelines as for the previous federal–provincial program. In 1999, NBEAP was funded completely by the New Brunswick Department of Natural Resources and Energy. The review committee that evaluates the applications consists of representatives from both government and industry. In 1999, the committee, chaired by Greg Crouse and comprising M. McLeod B. Roulston and D. Lentz, reviewed 20 applications and recommended that 10 applicants receive assistance for a total of $350 000.

COMPUTERIZATION OF GEOSCIENCE DATA AND GIS-RELATED PROJECTS (M.P. Rennick, K. Mersereau and D. Richard) Staff continued to update databases using the Geoscience Information System (GSIS). The following ten GSIS-related projects were conducted during the year.

Base Maps (M.P. Rennick and D. Richard) Customized 1:20 000 scale base maps were provided to provincial field geologists working on the Restigouche and other mapping projects, to federal geoscientists, and to industry. These maps were produced by combining Service New Brunswick 1:10 000 scale bases and contours from the Digital Elevation Model, and adding updated road network information obtained from Timber Management Branch. These maps contain selected features of the original Service New Brunswick base.

Airborne Geophysical Survey (M.P. Rennick) The contractor for the airborne geophysical survey over most of the Kedgwick project area (Figure 3: 1) provided digital files of hydrographic, topographic layers in DXF format. The GIS Section staff have been customizing these files upon request. To date, the contractor has been sent all the files that will be needed for the completion of the project.

Bedrock Geology Maps (K. Mersereau and D. Richard) Maps for the EXTECH-II, Restigouche and bedrock-related projects were digitized and hard copies were produced for public distribution. A few bedrock geology maps completed before 1990 were also digitized depending upon the priority and availability of digitization resources. The first priority is to digitize all bedrock geology maps produced after 1990. The geology maps for southeastern New Brunswick were digitized at 1:50 000 scale; these maps are being edited by Malcolm McLeod. The production of a new digital 1:500 000 bedrock geology map of New Brunswick is in progress, with completion expected 1n 2000.

Surficial Geology Maps (K. Mersereau) All the surficial geology maps completed since 1990 are being digitized for public distribution.

Industrial Mineral Maps (K. Mersereau) All maps, from the Aggregate Resource Atlas, consisting of geology and aggregate resources, are being digitized and are available for public distribution.

Digital Mineral Claim Management System Andy LeBlanc has continued to update the mineral claim maps using the Digital Claim Management System. Standard 1:50 000 and 1:150 000 hard-copy mineral claim maps are produced in Fredericton for public distribution and internal use.

Assessment Work Location Maps for New Brunswick These 1:50 000 maps continue to be updated by Ken Mersereau.

Geoscience Publication Indexing System (GPIS): During the initial probing study of the Integrated Mineral Resource Management System (IMRMS), the GPIS was identified as the first priority. Developed in 1996, the GPIS is designed to provide users with a means for quickly searching a large database containing publication information. Included is geoscience information on New Brunswick published by the Geological Survey of Canada (maps and reports), by the mineral industry (mineral exploration reports of work), and by scientific journals (papers). Copies of all publications are held by the Minerals and Energy Division. Queries may include map scales, repository information, authors, subject key words, and prices.

Minimum hardware and software requirements of the system are: IBM-compatible PC with 486 microprocessor, Microsoft Windows 95, 16 MB RAM, hard drive with 500 MB of available space, mouse, SVGA colour monitor, and printer.

By the summer of 1996, the programming was completed and existing data were transferred into the system. Each of the three main databases (list of publications, geoscan index, and bibliography) were edited and updated by Shasta Merlini and Lori Fellows.

Sample and Analysis Subsystem As defined in the IMRMS study, this system will manage all data associated with physical samples collected from the field as well as the results of analyses performed on those samples. As a first step, the system will bring the many existing files containing geochemical analysis data into a common database. It will provide the necessary input, inquiry, and output functions for that database.

The standard structure will accommodate the results of geochemical analysis performed on drill core, water, stream silt, till, and rock samples. This will maximize usability of geochemical data within the Minerals and Energy Division and improve the mechanism for exporting this data to industry clients.

The project team consisted of Greg Crouse (Drill Core and Samples), Chris Gasper (System Analyst), Rao Irrinki (Project Leader), Chris Leadbeater (Database Administrator, Programmer/Analyst), Malcolm McLeod (Lithogeochemistry–Sussex), Toon Pronk (Geochemistry), Paul Rennick (GIS Specialist) and Jim Walker (Lithogeochemistry–Bathurst). The first phase of the project, which detailed the database structure, was completed by September, 1997.

The geochemistry database has been loaded with sample data. The sample data were used to test the importing and exporting utilities. Network connections have been made for Paul Rennick and Toon Pronk in order to carry out final testing.

Similar to the geochemistry database, a geophysical database project was initiated. A project team consisting of Chris Gasper (System Analyst), Rao Irrinki (Project Leader), Chris Leadbeater (Database Administrator, Programmer/Analyst), and Paul Rennick (GIS Specialist), was formed in late 1997. The database was built and tested by Paul Rennick. Custom reporting and input utilities remain to be created.

Mineral Claim Tracking System This system, which has been utilizing dBase III to manage mineral-claims-related information, is in the final stages of being upgraded to a relational INGRES database, by Phil Butland of Information Services and Systems. Based on the scope and objectives of the IMRMS, the Resource Allocation System will manage all resource rights, including mineral claims, leases and agreements. The system is now undergoing testing, with the need to create custom reporting utilities. A utility to incorporate a graphical interface to the digital Mineral Claim Maps is to be developed by Information Services and Systems.

MINERAL INFORMATION SERVICES (MIS) (D.J.J. Carroll, C.M. McNeill-Dobbelsteyn) This Section is responsible for providing a variety of geoscientific, technical, and support services to the staff of the Minerals and Energy Division and to the clients of the Department of Natural Resources and Energy. Specifically, the staff provides assistance to the public and the mineral industry by supplying publications on the geology and mineral resources of the Province.

Some of the other functions that the MIS Section is responsible for include publicizing the Division's extensive electronic and hard-copy geoscientific database and promotion of mineral exploration in New Brunswick. The collection and collation of mineral exploration expenditures represents another activity carried out by this unit. In addition to providing services to the mineral industry and public sectors, the MIS Section also provided cartographic support to the staff of the Division.

The Mineral Information Services Section continue to work closely with the Public Service Section of the Department to ensure that our clients (mainly mining, mineral exploration and engineering sectors) are continuing to receive quality service when it comes to the acquisition of geoscience publications.

Staff of the Mineral Information Services section (Figure 1c) consists of: Donald J.J. Carroll (Coordinator), L. Gerard Johnson (Cartographic Technician), Terry Leonard (Cartographic Technician), and Carol McNeill-Dobbelsteyn (Geoscience Research and Planning Officer). The section is made up of two work units: Geoscientific Cartographic Services and Geoscientific Information Services.

In 1999, a review of the Geoscience Publication Indexing System (GPIS) by selected staff of the headquarters and regional offices took place. The purpose of the review was to determine the effectiveness of the GPIS system in assisting people to retrieve references for documents within the Geological Surveys Branch library of documents. The results indicated that the GPIS could be a functional tool to assist our staff; however, it won't be totally effective until all references to the publications have been keyed into the System.

Publications An important function of the Mineral Information Services unit is the dissemination of geoscience publications to the mineral exploration industry as well as to engineering, consulting, and environmental firms. Although the actual function of assisting clients in the procurement of geoscience data is now the responsibility of the Public Service Section, the MIS continues to monitor our product distribution and client base.

In 1999, approximately 627 requests for geoscience information were answered. The majority of these requests came from three main user groups: the mineral industry, consultant and engineering groups, and agencies of the federal and provincial governments. However, over the past two years there has been an increase in requests for geoscience information from the oil and gas sector. This change is due primarily to the heightened interest in exploration for nonrenewable resources in southeastern New Brunswick.

Mineral Information Services prepared 10 publication notices that were sent to more than 300 clients on our mailing list. These notices publicized 46 plates and 31 geoscience and technical reports. The following is a summary of the contents of the 1999 notices.

February: *List* of new publications available: 4 maps, 4 reports and 7 Geological Survey of Canada (GSC) publications.
March: *Timed release* of OF 99-3 and 4 plates (MP 99-6 to 99-9): Till geochemistry of the Sevogle area (NTS 21 P/04W), Northumberland and Gloucester counties, New Brunswick. Release date: April 6, 1999.
April: *List* of new publications available: 20 maps, 7 reports and 1 GSC publication.
Timed release of OF 99-7: Till geochemistry of the New Brunswick part of the Forest City (NTS 21 G/12) and Fosterville (NTS 21 G/13) map areas, York and Carleton counties: site and geochemical data. Release date: May 25, 1999.
July: *List* of new publications available: 4 maps and 5 reports.
Notice of availability of Mineral Resource Report 99-5: EXTECH II Geoscience Data Base Viewer, Bathurst Mining Camp, New Brunswick.
Timed release of OF 99-10: Till geochemistry of the Nepisiguit Falls map area (NTS 21 P/05), Gloucester and Northumberland counties, New Brunswick. Release date: August 3, 1999.

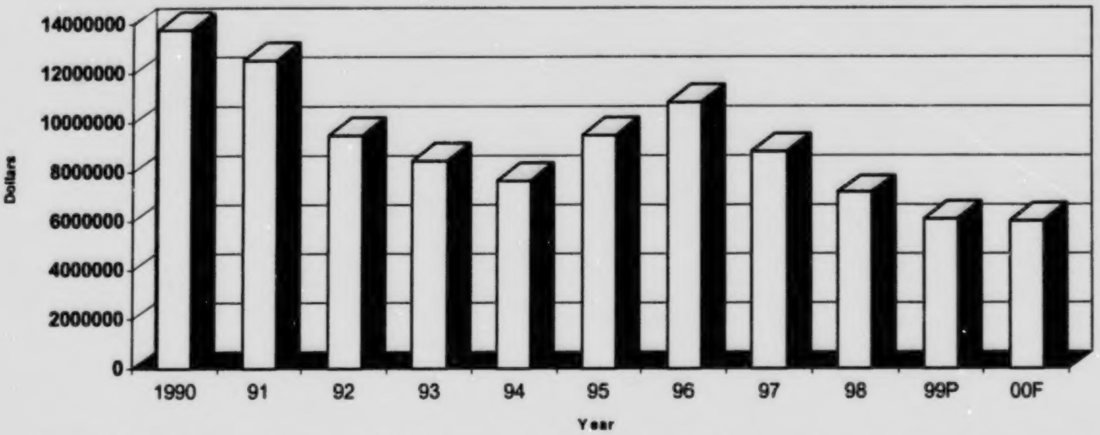


Figure 4. Total annual expenditures (general and mine-site exploration, no overhead) by mining and exploration companies in New Brunswick, 1990 to 2000F. Source: Natural Resources Canada ($1986=100). Abbreviations: P (preliminary); F (forecast)

September: *List* of new publications available: 14 maps, 1 report and 1 GSC publication.
Timed release of OF 99-11: Till geochemistry of the Millville (NTS 21 J/03) map area, York and Carleton counties, New Brunswick: site and geochemical data. Release date: September 28, 1999.
Registration package: 24th Annual Review of Activities preliminary agenda, field trip notice, Banquet speaker information, registration form, etc.)

The distribution and sale of geoscientific publications from the Fredericton office in 1999 totaled 4022 documents, a 14% decrease from the 1998 total of 4655. Staff received 80 requests for photocopies of mineral exploration reports of work, oil and gas lithological logs as well as other hard-copy and microfiche data. These orders represented a total of 9963 pages of text and 1329 maps. Revenue generated from the sale of publications and photocopies for all three Division offices (Bathurst, Fredericton, Sussex) in 1999 was $18 817, a 21.6% decrease from 1998. More than 79% of the publications sold in 1999 were requested by the mineral industry and engineering sector. Although request numbers for digital data was up 5.3% over last year, the actual sale of digital data files was down 28% in 1999. This year 20 requests were received from 14 separate clients resulting in approximately 71 digital files being sold and $860 being generated in revenue. This total revenue figure represented a 30% decrease from 1998 sales.

Mineral Exploration Reports of Work A total of 113 mineral exploration reports of work were filed with the Resource Rights Allocation Section in 1999, which represented a 31% decrease from the 160 reports submitted in 1998. The dollar value of work reported in these documents ($ 3 969 329) was down 51% from that reported in the previous year ($8 136 433). To date, 5312 reports of work have been filed with the Resource Rights Allocation Section. They are maintained by Mineral Information Services.

Annual Exploration Surveys Mineral exploration expenditure surveys are carried out by Natural Resources Canada, assisted by the New Brunswick Department of Natural Resources and Energy (Mineral Information Services Section). The exploration expenditures are collected through two surveys each year. The Preliminary/Forecast expenditure survey in September was followed by the Actual survey in January. Table 2 summarizes the results of the most recently available surveys. Figure 4 presents historical data on mineral exploration expenditures for New Brunswick.

Table 2. Summary of Mineral Exploration Expenditure Surveys
(Source: Natural Resources Canada)

Form No.	Survey Name	Number Surveyed	General Exploration	Mine Site Exploration	Total*
Ex-1	Preliminary '98	115	$ 7 000 000	$ 1 600 000	$8 600 000
Ex-3	**Actual '98**	**62****	**7 500 000**	**2 500 000**	**10 000 000**
Ex-1	Forecast '99	115	5 400 000	2 000 000	7 400 000
Ex-1	Preliminary '99	56**	6 330 000	2 170 000	8 500 000
Ex-3	**Actual '99**	**n/a**	**n/a**	**n/a**	**n/a**
Ex-1	Forecast '00	56**	6 230 000	2 170 000	8 400 000

n/a not available
* Survey includes overhead expenditures
** Individual claim holders grouped and survey results combined on 1 form

Public Awareness / Promotion The Minerals and Energy Division recognizes the need to be proactive when it comes to promoting mineral investment in New Brunswick. Annually, the Division supports the production of new geoscience displays and attendance at several mineral exploration industry conferences.

The Mineral Information Section is responsible for publicizing the Minerals and Energy Division's extensive geoscience information base and encouraging investment in our provincial mineral resources. Meetings such as the 1999 Annual Cordilleran Exploration Roundup in Vancouver, the 67th Annual International Convention and Trade Exhibition of the Prospectors and Developers Association of Canada in Toronto (March) and the 24rd annual Review of Activities in Fredericton (November) were the main targets of our promotion campaign in 1999.

Attendance at the Annual Cordilleran Exploration Roundup in Vancouver (January 26–29, 1999) by two staff members, John Langton and Don J.J. Carroll, represented the fourth opportunity for the Division to tap into the western Canadian market as part of its promotional strategy to attract mineral exploration investment dollars to New Brunswick.

In addition to Division staff, the New Brunswick delegation at the Cordilleran Roundup included Terry Mersereau, Mike Taylor, Wayne Lockhart and Rob van de Poll. This year, the New Brunswick Prospectors and Developers Association did not send a representative to the Cordilleran Roundup, but instead supported two members to attend the March 1999 Prospectors and Developers Association conference in Toronto.

The second major conference that the Division attended in 1999 was the Annual International Convention and Trade Exhibition of the Prospectors and Developers Association of Canada (PDAC), which was held in Toronto on March 14–17. Once again, the venue for the Trade Exhibition was the Metro Convention Centre. In contrast to previous years when New Brunswick was represented in two exhibit areas at the PDAC, the Atlantic Canada Rock Room and the Provincial Geologists area, this year the Division sponsored only one booth, which was located in the GSC–Provincial Geologists Team Canada exhibit area.

The Geological Surveys Branch also continued its efforts to financially assist members of the New Brunswick Prospectors and Developers Association (NBPDA) whose mineral properties warrant broader attention and publicity. Two prospectors, Rufus Smith and Emilio Doiron were provided financial support to attend the 1999 PDAC conference. In addition, the Department provided financial support to the NBPDA's Atlantic Canada Rock Room. In addition to these two prospectors, the New Brunswick contingent in the Rock Room included K.D.A. Whaley (Mactaquac Mining Limited), Cobrun Mining Corporation and Ian and Donald Graham.

Several New Brunswick service sector companies exhibited for the first time at the annual PDAC. In 1999, these included Maritime Groundwater Inc., EMR Technologies, Major Drilling Group International Inc., Thibault & Associates, IPTEC, Universal Systems Ltd.

Advertisements / Editorials The Division placed a limited number of advertisements in 1999. Those that were placed included: (1) Investing in the Americas Conference (March 1999), (2) The Daily Gleaner (May 1999). An editorial was published in the Prospectors and Developers Association of Canada Digest (March 1999): "Base Metals Still Draw Explorers to New Brunswick."

Review of Activities The 24th annual Review of Activities of the Minerals and Energy Division was held at the Sheraton Inn in Fredericton on November 1–3, 1999. This year's event commenced with a pre-meeting geological field trip to southwestern New Brunswick where field trip delegates had an opportunity to visit outcroppings of the St. Stephen gabbro, the St. Stephen nickel deposit, and the Didequash claim group of prospector Peter Fenety. The field trip attracted more than 50 participants from various parts of New Brunswick and eastern Canada.

The annual Review '99 commenced on Monday, November 1, with a special evening lecture series on "The Big Bald Mountain massive sulphide deposit" in Maine. Two geologists from the United States Geological Survey were invited to participate in this year's Review. They had organized a field trip to the Big Bald Mountain deposit and other areas in Maine the previous year. The lecture was followed by the traditional reception hosted by the New Brunswick Department of Economic Development, Tourism and Culture.

On Tuesday morning, presentations were made by the regional geologists and the chairman of the University of New Brunswick Geology Department. The afternoon sessions consisted of lectures by Division and Geological Survey of Canada–Québec geoscientists, university students, and special guest lecturers from the exploration industry. This year, K.H. Poulsen spoke on "Carlin-type gold deposits and possible Canadian analogues" while M. Malo of INRS–Georessources followed up with a talk on "Contrasting styles of gold mineralization along the Grand Pabos–Restigouche fault system: Implications for Carlin-like Au mineralization in the southwestern Gaspé Appalachians." A. Hamilton of Noranda Inc. closed the Tuesday sessions with a historical review of "The Heath Steele mine (1954–1999), Bathurst Mining Camp, New Brunswick."

In order to broaden the traditional scope of the 1999 annual Review of Activities, a special session entitled "New Brunswick's mineral industry...focussing on the future" was held on Wednesday morning.

The session revolved around five themes: (1) our mineral wealth; (2) New Brunswick's mineral industry success stories; (3) economics and the mineral resources sector; (4) new relationships–new opportunities; and (5) communities and mining. Nine speakers representing the mining industry, exploration sector, provincial and federal governments, transportation sector, and a mining community gave detailed presentations. The speakers included, Keith Brewer (Natural Resources Canada), Rao Irrinki, (NB Geological Surveys Branch), Frank Derrah, (Havelock Lime–A Division of Goldcorp Inc.), Wayne Lockhart (Lockhart Exploration Services Ltd.), Peter Vuillemot, (Atlantic Provinces Transportation Commission), Jim Chandra (New Brunswick Department of Economic Development, Tourism, Culture), Gwen Martin (G.L. Martin & Associates), Paul Ouellette (Mayor of Bathurst) and a representative of Major Drilling Group International Ltd.

In total, the technical program in 1999 offered the delegates a cross section of talks by approximately 27 presenters from the mineral exploration and mining industry, and the federal, provincial, university, and geoscience organizations.

This year, more than 50 exhibits and posters were displayed by federal and provincial government agencies, the mineral industry, prospectors, service companies, and the various associations. Once again, there was a strong focus on providing prospectors and junior mining companies with an opportunity to promote their mineral properties in the New Brunswick Core Shack area. The organizers in 1999 were fortunate enough to find exhibit space for two out-of-province service companies who wanted to be part of the Trade Show component.

The annual Review of Activities also provides an opportunity for mineral-related groups or associations to hold annual or general meetings. The New Brunswick Prospectors and Developers Association and the Association of Professional Geologists of New Brunswick took advantage of this time period to arrange meetings for their membership in conjunction with the Review.

The 1999 Annual Review of Activities banquet speaker was Mr. George Miller, Director, The Industry Government Relations Group Inc. His banquet speech was titled, 'The Future of Mining in New Brunswick: Challenge or Opportunity'. One hundred and twenty-five people attended the banquet.

The Review attracted 250 registrants, more than 49% of whom were associated with the resource industry, including the mineral exploration and mining sectors, prospectors, consultants, and service companies.

Public Awareness: New Brunswick Mining Week One of the major public awareness activities for the mineral industry in New Brunswick is Mining Week, an annual promotion this year held on May 9–15, 1999. Once again the theme was "Mining Makes It Happen." This represented New Brunswick's 10th year of New Brunswick Mining Week celebrations. It coincided with the National Mining Week.

The week's activities were coordinated by the New Brunswick Mining Association. Some of the contributors were: New Brunswick Branch of the Canadian Institute of Mining, Metallurgy and Petroleum; N.B. Coal Limited; New Brunswick Prospectors and Developers Association; New Brunswick Department of Natural Resources and Energy (DNRE); and New Brunswick Department of Education. Displays at malls, special guest speakers, promotional advertisements, open houses, radio and newspaper advertisements, and Mining Week proclamations by local communities were some of the events or materials presented during Mining Week 1999.

To increase the public's awareness of the various Mining Week events, the New Brunswick Mining Association, in cooperation with the Department's Communications Branch and Natural Resources Canada, organized a provincial weekly newspaper promotion campaign.

In 1999, the main Mining Week event in Fredericton returned to the format of hosting local Grade 6 classes from the Fredericton Area District 18 schools at the H.J. Flemming Forestry Centre. Although this event was shortened compared to previous years, approximately 100 students were able to visit the Centre to view the 20 exhibits and take part in other presentations.

A new approach to informing the public about the mineral industry, or at least some facets of it, was the offering of two weekend tours around Mining Week. The first, called "Getting Stoned," was a guided tour of some of the stone buildings in downtown Fredericton. Designed by Gwen Martin and led by Toon Pronk, this 45 minute walkabout proved to be quite popular with the local population. A second tour, called "Walk for the Rocks," was arranged and conducted by Wayne Lockhart. This prospecting field trip in the University of New Brunswick woodlot, designed as a family activity, was also a popular Mining event. In all, more than 60 local people took advantage of these two weekend tours.

A special Mining Week project was initiated in 1999 by the Geological Surveys Branch that resulted in the production of a self-guided field trip pamphlet called "Science Below the Surface" / "La Science du Sous-Sol." This product, created and designed by Moncton freelance writer and mineral collector, Hans Durstling, highlights four areas within the Fredericton region where people can visit geological features.

Special Projects The following special projects were conducted during the year:

Restigouche Geophysical and Geochemical Surveys (R.R. Irrinki, S.R. McCutcheon, A.G. Pronk) After the success of the Bathurst Geophysical Survey and the EXTECH-II project, the Geological Surveys Branch, in consultation with industry, spearheaded the Restigouche Project (Figure 3: 1). The project comprises three phases. Phase I called for an airborne geophysical survey (same specifications as the Bathurst Mining Camp geophysical survey) and a stream-sediment geochemical survey to be carried out over a test block in the northeastern part of the Kedgwick zone. Phase II consisted of an evaluation of Phase I results, including follow-up mapping by Geological Surveys Branch staff. It was carried out in 1998–99. Phase III, which involves geological, geophysical and geochemical surveys for the entire Restigouche Project area, was recommended based on the evaluation of the Phase I results. Phases I, II and III were budgeted at $540 000, $50 000 and $2 200 000, respectively. The rationale for carrying out the project is simple. The northwestern part of the province has not been mapped in detail during the last 20 years. The Restigouche belt contains rocks similar to those of the Gaspé belt, which hosts several porphyry-skarn deposits, including the famous Mines Gaspé mine at Murdochvilleand numerous gold occurrences. There is also a reasonable expectation that the Restigouche belt could host large, low-grade, Carlin-type (Nevada) gold deposits. The area has one significant mineral deposit, the McKenzie Gulch deposit (440 000 t grading 1.7% Cu and 10 g/t Ag) and several documented showings. Because only a few claims have been staked in the area, there is good potential to increase exploration in the area.

Phase I was approved in 1997 with provincial funding of $540 000 ($440 000 for the geophysical survey and $100 000 for the stream-sediment geochemical survey). The airborne geophysical survey was contracted to AERODAT Inc., who carried out 10 630 line kilometres of the geophysical survey, involving the collection of electromagnetic, magnetic, and radiometric data at a line spacing of 200 m and at a flight direction of N 46° W. Frank Kiss, Ken Ford and Peter Holman of the Geological Survey of Canada carried out the field checking. Frank Kiss was also involved in the positioning and processing of the magnetic and electromagnetic data. Rob Shives and John Carson of the Geological Survey of Canada were involved in the positioning and processing of the radiometric data. After AERODAT Inc. went into receivership, the department transferred the contract to High-Sense Geophysics Limited, which acquired all the assets of AERODAT Inc. In 1998, more than 100 maps and several digital files were released to the public.

The geochemical survey was contracted to Mactaquac Mining Ltd., which collected 750 stream-sediment samples. Peter Friske of the Geological Survey of Canada and Toon Pronk of the New Brunswick Geological Surveys Branch coordinated the geochemistry project. Peter Friske, Toon Pronk and Mike Parkhill also carried out an orientation geochemical survey for the test area. Geochemical survey results were also released in 1998.

Evaluation of the Restigouche geophysical and geochemical survey results (Phase II) was approved with funding of $50 000. The Geological Surveys Branch hired Kay Giggie to carry out the evaluation. She conducted a client survey on the usefulness of the released data for exploration stimulation, field tested a few geophysical anomalies, evaluated the geophysical data with respect to the underlying bedrock geology, and prepared an evaluation report that was published in 1999.

In 1999, part of the proposed Phase III of the Restigouche Project was approved with a funding of $500 000 ($400 000 for Geophysical Survey and $100 000 for Geochemical Survey). The surveys were conducted in the Kedgwick area, west of Phase I (Figure 3: 1). As in the previous surveys, Geological Survey of Canada staff carried out the field checking and quality control on the data. Geoterrex-Dighem Ltd. received the contract on geophysical surveys and will complete the survey by March 2000. Precise Surveys Ltd. of Miramichi received the contract for collecting geochemical samples and collected the samples in 1999. The results of geophysical and geochemical surveys will be released to the public in June 2000.

CONFERENCES / WORKSHOPS Paul Rennick gave a presentation at the Division's Review of Activities; Greg Crouse and Paul Rennick presented a poster display at the Review of Activities. Paul Rennick attended the CARIS conference held in Fredericton..

Don Carroll participated in the Annual Cordilleran Exploration Roundup in Vancouver, British Columbia in January and the Annual International Convention and Trade Exhibition of the Prospectors and Developers Association of Canada in Toronto, Ontario in March. He was in charge of organizing the Division's annual Review of Activities, held in Fredericton in November. For details, see the Mineral Information Services Section.

COMMITTEES Greg Crouse was the committee coordinator of the Mineral Exploration Stimulation Program and New Brunswick Exploration Assistance programs.

Paul Rennick was a member of the Geographic Information System subcommittee, the Georeferenced Civic Address Data Base working group and the Information Technology Advisory Committee.

Mines and Energy Branch

Darwin Curtis, Director

The Mines and Energy Branch is responsible for the allocation and development of the Province's mineral and energy resources in a manner optimizing economic benefits while sustaining environmental quality. It is responsible for fostering a secure supply of competitively priced energy through policy and regulatory activities relating to energy infrastructure and markets. It is also responsible for promoting energy efficiency and air emissions reduction.

The Branch administers the following statutes and their related regulations: *Mining Act; Quarriable Substances Act; Oil and Natural Gas Act; Bituminous Shale Act; Underground Storage Act; Pipeline Act; Gas Distribution Act 1999; Public Utilities Act; Gasoline, Diesel Oil and Home Heating Oil Pricing Act;* and *Energy Efficiency Act.*

COMMITTEES Darwin Curtis is a member of the National Air Issues Coordinating Committee (Climate Change) and attended regular meetings of the committee in Regina, Saskatchewan in April; in Halifax, Nova Scotia in August; in Toronto, Ontario in September; in Vancouver, British Columbia in October; and in Calgary, Alberta in December, 1999. He is a member of the National Advisory Council on Energy Efficiency and attended a regular meeting in Ottawa, Ontario in September.

CONFERENCES In May, Darwin Curtis attended the Canadian Energy Research Institute training seminar in Halifax, Nova Scotia. In September, he attended the Annual Conference of Mines and Energy Ministers in Charlottetown, Prince Edward Island, and in May, he attended Canada's Energy Efficiency Conference and Trade Show in Ottawa, Ontario.

Resource Rights Allocation

In 1999, Resource Rights Allocation staff (Figure 1d) consisted of Ron Shaw (Manager, Recorder), Fred Edney (Deputy Recorder–minerals), and Ron Phillips (Energy Resource Rights Admin.–oil, natural gas, bituminous shale and underground storage).

Reports of work, submitted to the Resource Rights Allocation Section in accordance with the *Mining Act, Oil and Natural Gas Act, Bituminous Shale Act,* and *Underground Storage Act*, are checked for compliance with the relevant regulations and work credits are applied to appropriate properties. Upon acceptance, the reports are forwarded to the Mineral Information Services staff for microfilming, and storage. Mineral resource allocation and exploration statistics are presented in Table 3 and Figure 5.

COMMITTEES Ron Shaw attended the annual Provincial/Territorial Mining Rights Committee meeting in Yellowknife in September of 1999. The committee is an informal forum established to share information regarding mining rights administration across Canada. In sharing such information, it is hoped that each jurisdiction would, over time, develop similar methods for dealing with similar mining rights situations.

CONFERENCES In May of 1999, Ron Shaw attended the 101st Annual General Meeting of the Canadian Institute of Mining, Metallurgy and Petroleum in Calgary, Alberta.

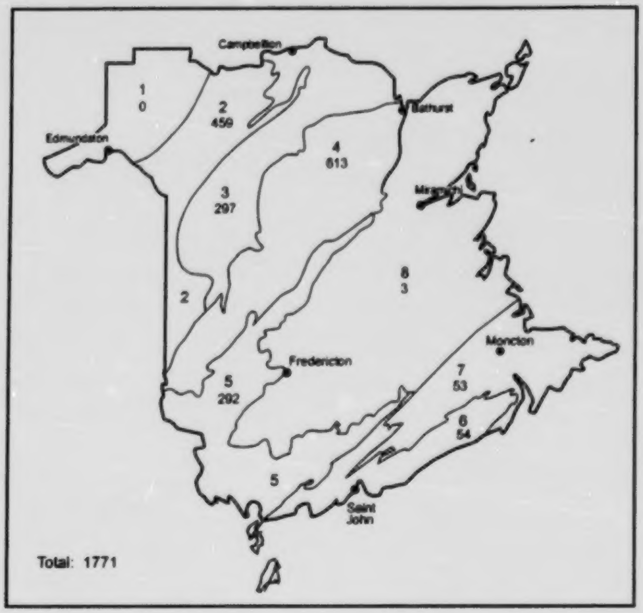
Table 3. Mineral Resource Allocation and Exploration Statistics, 1998 and 1999

Mineral Resource Allocation (total in effect at year's end unless specified for the year)	1998		1999	
	Number	Hectares	Number	Hectares
Mining Act				
Prospecting Licences	1 382	---	1440	---
Claims Recorded (year)	2 500	40 000	1 771	28 336
Claims Renewed (year)	15 719	251 504	12 641	202 256
Claims Expired (year)	5 970	95 520	4 822	77 152
Claims in Effect	17 841	285 456	14 884	238 144
Coal Agreements	5	62 458	4	58 917.6
Potash Exploration Agreements	0	0	0	0
Potash Leases	2	28 052	2	20 024.2
Mining Leases	17	12 528	17	12 528
Total Agreements and Leases (above)	---	103 038	---	91 469.8
Total in Effect	---	389 104	---	341 792
Oil and Natural Gas Act				
Licences to Search	29	635 036	28	624 978
Leases	1	2 154	5	5 744
Bituminous Shale Act				
Licences to Search	1	24 610	0	0
Development Permits	2	1 077	2	1 077
Leases	0	0	0	0
Underground Storage Act				
Storage Exploration Licences	7	27 920	7	28 731
Storage Licences	0	0	0	0
Construction Permits	0	0	0	0
Quarriable Substances Act				
Quarry Permits	280	---	301	---
Quarry Leases	15	629.62	15	629.62
Peat Exploration Licences	2	228	4	1955
Peat Leases	31	12 845	33	13 303.6
Peat Options	12	5 022	14	4 604

Exploration Summary	1998		1999	
	Work Reported	Value	Work Reported	Value
Mining Act				
Reports of Work (RW)	163 reports filed	$8 136 433	113 reports filed	$3 969 329
Drilling Reported in RW	268 holes (57 342 m)	$4 050 278	143 holes (23 982 m)	$1 598 834
Potash Exploration	---	0	---	0
Oil and Natural Gas Act	1 well (2015 m)	n/a	3 wells (5370 m)	n/a
Bituminous Shale Act	8 wells (5800 m)	n/a	1 well (387 m)	n/a
Underground Storage Act	---	0	---	0

n/a not available

February 15, 2000



Geological zones*:
1. Edmundston
2. Kedgwick
3. Tobique–Chaleur; Elmtree
4. Miramichi North (Bathurst Mining Camp); Miramichi South
5. Fredericton; Passamaquoddy
6. Saint John
7. Moncton Subbasin (Maritimes Basin)
8. Carboniferous Cover (Maritimes Basin)

* This is a simplification of the recently revised terrane map of New Brunswick.

Figure 5. Number of claims recorded, by geological zone, in 1999.

Mines and Energy Development

The Mines and Energy Development Section is responsible for the approvals, operations monitoring, and abandonment and reclamation of mineral and energy resource developments and pipelines. These include mines, pits and quarries, oil and gas exploration and production facilities, pipelines, underground storage and bituminous shale developments. Several section staff are members of the Standing Committee on Mining and Environment, a committee designed to facilitate the mine approvals process. Further processing of resources and value-added opportunities are encouraged through the administration of the Value-Added/Mineral Processing (VAMP) Program. The Section participates in the development and implementation of a broad range of policies and regulations affecting mineral and energy resource and infrastructure development. The Section manager is Sam McEwan.

The Mines and Energy Development Section (Figure 1d) consists of four main components: Mine Engineering, Reclamation Engineering, Hydrocarbon Engineering and Quarriable Substances Administration. The Mine Engineering and Reclamation sections collectively are responsible for the review of feasibility studies, mine plans and reclamation plans, and the monitoring of both active mining operations and inactive mine sites. Hydrocarbon development includes the review and approval of new pipelines, changes to existing pipelines, drilling rigs and BOP (blow out preventor) requirements, and to ensure compliance of existing pipelines and related hydrocarbon activities in the province. The administration of the removal of aggregate resources from Crown land is also the responsibility of this sector and is managed under the *Quarriable Substances Act*. The Mines and Energy Development Section works actively with the Department of Environment through the Standing Committee on Mining and Environment in the review of all mining, energy, and environment-related issues. The sector advances further processing and looks for value-added opportunities within the mineral sector through its Value-Added/Mineral Processing Program (VAMP). This is a program that will cost-share, on a 50/50 basis, eligible projects to a maximum of $30 000.

MINE ENGINEERING (John Griggs) The mine engineer is responsible for work of both a specific and general nature relating to the mining industry of New Brunswick. Responsibilities include the monitoring of mining activities; compilation of technical and mining statistics; administration of the *Mining Act*; review and evaluation of feasibility reports and annual mine plans; and administration of projects funded under the provincial VAMP Program. In addition to these specific tasks, the mine engineer liaises with the federal government and other provincial governments on matters related to the mining industry.

During 1999, the mine engineer monitored mine-related activities and reviewed a number of mine plans received in compliance with the *Mining Act* (Section 25, Regulation 86-98). Numerous submissions under the Environmental Impact Assessment Regulation of the *Clean Environment Act* were also reviewed.

Issues requiring the attention of the mine engineer included regulatory requirements related to the suspension of operations at Breakwater's Caribou mine (see Figure 9 in Chapter 3 for mine locations), which shut down in August 1998 in response to continuing metallurgical problems and depressed metal prices. Potash Corporation of Saskatchewan–New Brunswick Division (PCS) continued compacting fine-grained material from Saskatchewan at the former Potacan facilities. The Potacan company was acquired by PCS after flooding caused the closure of the Cassidy Lake mine in 1997. In 1998, PCS reported an inflow of water at its mine near Sussex. Significant progress has been made in identifying and controlling the source of the inflow. NovaGold Resources Inc., the parent company of Murray Brook Resources Inc., decided to close permanently the Murray Brook mine. An updated reclamation plan was submitted and approved in 1999, with final closure planned for 2000. ADEX's Mount Pleasant project remained under care and maintenance as prevailing metal prices could not make the mining operation viable. The company continued discussions with potential investors. Noranda's Brunswick mine brought two major capital projects on stream. In 1998, the company had commissioned a paste fill system utilizing tailings to replace rock fill from the company's quarry and installed an autogenous mill in the concentrator. Throughput in 1999 was higher than in the previous year. Noranda's other mine in New Brunswick, Heath Steele, closed permanently on October 31, 1999. Closure-related activities had already begun in 1998, including salvaging of equipment and the implementation of environmental protection measures. Reclamation activities continue at the site and are expected to take several years.

RECLAMATION ENGINEERING (Cory Neumann) The Reclamation Engineer is responsible for departmental coordination of the reviews of mine reclamation and closure plans, annual reclamation progress inspections, and coordination of the provincial mine approval process as it deals with environmental issues, exploration, and mine site audits. In addition, the reclamation engineer liaises with the federal and provincial governments and industry on matters related to mining and the environment.

Issues requiring the attention of the reclamation engineer during 1999 were closure of Heath Steele Mines and the beginning of final reclamation, including removal of site infrastructure. Final closure plans were reviewed and approved for the Murray Brook mine site (see Figure 9 in Chapter 3 for mine locations). Final closure for the site involves the placement of tailings into the open pit, recontouring the gossan tailings pile and general site grading and stabilization. Requests for closure for several NB Coal mine sites were reviewed. Reclamation plans were reviewed and approved for the new Plaster Rock Gypsum and Limestone quarries and for Havelock Lime's Hicksville limestone quarry. A number of environmental and reclamation issues related to CanZinco's Caribou mine and ADEX's Mount Pleasant mine were under review by the Standing Committee on Mining and Environment. Gordex Minerals Limited's Cape Spencer property and APOCAN's Lake George antimony property remained inactive during 1999.

Most mining companies have maintained their reclamation on disturbed land in accordance with their approved schedule. Reclamation and remediation progress is on-going at several properties, with some moving to final closure.

HYDROCARBON ENGINEERING The Hydrocarbon Engineer, Don Persaud, is responsible for the review and approval of new pipelines, changes to existing pipelines, drilling rigs and BOP (blowout preventor) requirements, and to ensure compliance of existing pipelines and related hydrocarbon activities in the province.

Pipelines The maintenance and repair program continues on the Lorneville pipeline (Figure 3: 19). The pipeline operated normally with no incidence of leaks. In addition to routine monitoring, a survey was conducted during the year to determine the condition of the cathodic protection. The survey showed that the cathodic protection was functioning adequately. The Department continues to work with Maritimes and Northeast Pipelines on the lateral natural gas pipeline to Saint John, and a potential pipeline to northern New Brunswick. Construction of the main transmission line across New Brunswick was completed in 1999.

Drilling MariCo Oil and Gas Corporation drilled a step-out well (Bull Creek #1) 850 m southeast of Downey #1 (Figure 3: 20). It had to be abandoned when the bit became stuck in the hole. In the fall of 1999, Corridor Resources Inc. spudded the Will DeMille #1 well northwest of Elgin (Figure 3: 21). A.A. (NB) Inc. carried out a shallow core hole drilling program in the Memramcook–Rosevale area (Figure 3: 22). Shell Canada Limited, with assistance from Three-D GeoConsultants Limited, completed nine wells (total length of 6200 m) in the Moncton area for bituminous shale (Figure 3: 23).

QUARRIABLE SUBSTANCES ADMINISTRATION (Mitchell O'Donnell) Quarriable substances on Crown lands in New Brunswick are administered under the *Quarriable Substances Act*. The Quarriable Substances Administrator controls, through the issuance of permits and leases, extraction operations on Crown lands and on that area of the shoreline that lies within 300 m above and 300 m below the mean high water mark.

The construction of the natural gas pipeline by Maritimes and Northeast Pipelines across the southern part of the Province resulted in major extraction activity. A total of 37 quarry permits were issued for quarry sites along the pipeline route, with approximately 300 000 t of material being removed from these sites.

Highway and infrastructure needs in the Bathurst, Miramichi, Acadian Peninsula, St. Stephen, Sussex, Fredericton, Moncton, and the Saint John areas resulted in the extraction of greater than 900 000 t of aggregate from Crown pit and quarry sites.

The demand for good quality sand for cranberry development in the Rexton and Richibucto areas resulted in the removal of approximately 17 000 t of material from a Crown pit in the St. Charles area.

Noranda Inc. removed 30 000 t of bedrock from its quarry lease site at Brunswick Mines. This material is used for backfill in the company's underground mining operations. It is anticipated that as Brunswick proceeds with its newly developed paste backfill project, the need for rock from its quarry lease site will diminish.

Forestry companies removed approximately 175 000 t of material from their ongoing forest operations across the Province. Most of this material went into forest road maintenance and construction.

The Crown land quarry inventory program continued in 1999, with approximately 80 pit and quarry sites being inspected and inventoried. This brings the total number of inventoried sites to 316.

In 1999, 2 444 594.1 t of quarriable substances were extracted from pits and quarries on Crown land in New Brunswick (2 765 235.43 t in 1998). Revenue from permis amounted to $611 148.52. Quarry lease rentals amounted to $31 481 and application fees amounted to $3010.

COMMITTEES John Griggs is a member of the Federal–Provincial Committee on Mineral Statistics, which coordinates the efforts of Natural Resources Canada and the provincial governments in the timely collection of relevant mineral statistics while minimizing the inconvenience to the respondent. In September, he represented the province at the annual meeting of this committee in Ottawa. Cory Neumann is a member of the University of New Brunswick Groundwater Studies Group, which looks at groundwater issues of interest in New Brunswick and the Maritimes and serves as a vehicle for information exchange between different levels of government, educational institutions, research institutions, and the private sector. Mr. McEwan is a member of the Intergovernmental Task Force on Offshore Mining, which is seeking a means of developing an Offshore Minerals Management Regime.

Sam McEwan and John Griggs are members of the Science and Technology Intergovernmental Working Group. This is a national committee consisting of provincial and federal representatives, which provide input to the federal government regarding their research and development programs on mining technology, which are of mutual interest to all provinces within Canada. While attending the Mining Millenium 2000 Conference, Mr. McEwan also attended the Intergovernmental Working Group on Mining, Minerals and Metals Science and Technology in Toronto.

Sam McEwan, John Griggs, and Cory Neumann are members of the interdepartmental Standing Committee on Mining and the Environment, which was established in 1989. The committee meets regularly during the year to address mining and environment issues. Mr. McEwan and Mr. Griggs are also members of the Interdepartmental Committee on Mineral Resources, a provincial committee with representatives from the departments of Economic Development, Tourism and Culture; Environment; and Natural Resources and Energy. This committee addresses mining issues common to all three departments.

CONFERENCES/WORKSHOPS/COURSES In February 1999, John Griggs, Cory Neumann and Sam McEwan attended the annual Operators' Conference sponsored by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) in Bathurst, New Brunswick. In September 1999, Mr McEwan and Mr. Griggs attended the CIM Convention and technical sessions, also in Bathurst. Mr. McEwan attended the Mining Millenium 2000 Conference in Toronto in March 2000. This conference was a special, one time event to mark the end of the millenium and was a joint conference of the Canadian Institute of Mining, Metallurgy and Petroleum, and the Prospectors and Developers Association of Canada.

Mr. McEwan also attended the Mines and Mineral Revenue Assessors Meeting in Regina, Saskatchewan in June, 1999. This conference provides a forum for Mine Assessors and those dealing with mining tax legislation to compare systems, problems and technologies related to this subject.

Energy Management

The Energy Management Section is responsible for energy infrastructure and market development and regulation. Energy efficiency and air emissions reduction are promoted through policies, programs and regulation. Energy supply and demand and commodity price statistics are compiled and analysed for policy development and public information. As the work is not directly related to resource development, further details are not presented in this report. The Section is managed on an interim basis by Darwin Curtis.

GEOSCIENTIFIC EDITORIAL SERVICES

The Geoscience Editor for Minerals and Energy Division publications, Barbara M.W. Carroll, reports to the Director of the Department's Communications Branch. She is responsible for editing geoscience maps and editing and formatting geoscience reports submitted by Division staff for publication as Mineral Resource Reports or Information Circulars. The third category, Open File, is published as received. A system of scientific/technical review has been put into place that ensures that peers review manuscripts before they are submitted for publication. Annually prepared publications include: "Preliminary Review of New Brunswick's Mineral Industry," "Rétrospective préliminaire de l'industrie au Nouveau-Brunswick," "New Brunswick's Mineral Industry," "Current Research," and "Abstracts/Résumés." In 1999, 22 reports and 56 maps were edited and/or prepared for publication.

CONFERENCES Barbara Carroll participated in the Mining Week activities held at the H.J. Flemming Forestry Centre in fredericton in May, 1999. In September, she attended the 29th Annual Convention of the New Brunswick Branch of the Canadian Institute of Mining, Metallurgy and Petroleum in Bathurst, New Brunswick. She also attended the annual Review of Activities of the New Brunswick Minerals and Energy Division held in Fredericton in November.

MINE TAXATION

Reporting to the Director of Financial Services, the Mine Assessor, Tanis A. Taylor, is responsible for the collection of all revenue due the province from mineral taxation and royalties.

The Mine Assessor is responsible for the administration of various Acts as they relate to the collection of taxes and royalties due the province, and is required to provide estimates for Central Government regarding the amount of revenue expected from each source. The Acts involved are: *Metallic Minerals Tax Act*, *Mining Act*, *Quarriable Substances Act*, and *Oil and Natural Gas Act*. Taxes and royalties collected in 1999–2000 amounted to $11 953 613. The metal mines subject to the *Metallic Minerals Tax Act* are required to make monthly payments, based on an estimate of the amount of taxes owing, and submit an annual tax return within six months of their year end. These annual returns are audited and assessment notices are issued. On-site audits as well as desk audits are conducted on companies subject to the *Metallic Minerals Tax Act* to determine compliance with the Act. On-site audits are also conducted on producers of other commodities to determine compliance with the appropriate acts.

Royalties are collected as follows: Monthly—coal, natural gas; Quarterly—potash, salt, oil; Semi-annually—peat moss, sand and gravel.

Provincial Mine Assessors and Mineral Revenue Assessors hold an annual conference in order to discuss matters of mutual concern associated with mineral taxation and collection.

MINING COMMISSIONER'S REPORT

Mr. Michael P. Quinn [Suite 301, 500 Beaverbrook Court, Fredericton, New Brunswick, E3B 5X4; Telephone (506) 450-0980; Fax (506) 450-7824].

In 1999, the Mining Commissioner, Mr. Mike Quinn, heard a dispute between Fernand Robichaud and Kevin Smith (applicants) and Noranda Exploration Co. Ltd., Mountain Lake Resources Inc., and Northeast Exploration Services (respondents).

Mr. Quinn's term as Mining Commissioner ended on December 31, 1999 and he did not re-offer for the position.

MINERALS AND ENERGY DIVISION PUBLICATIONS

Reports

ADEX Mining Corp. 1999. Design of process purification flowsheet for production of indium metal, Mount Pleasant property, New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-1, 247 p.

Brennan, J. 1999. Inventory of orphan oil and natural gas wells in the Dover and Gautreau Village areas of Westmorland County, New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-5, 80 p.

Brennan, J. 1999. Method study and cost analysis of abandoning orphan oil and natural gas wells. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-6, 88 p.

Carroll, B.M.W. (editor) 1999. Preliminary review of New Brunswick's mineral industry, 1998. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Mineral Resource Report 99-1, 24 p.

Carroll, B.M.W. (rédactrice) 1999. Rétrospective préliminaire de l'industrie minérale au Nouveau-Brunswick, 1998. Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick, Division des ressources minières et de l'énergie, Rapport sur les ressources minérales 99-2, 26 p.

Carroll, B.M.W. (editor) 1999. New Brunswick's mineral industry, 1998. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Mineral Resource Report 99-3, 126 p.

Carroll, B.M.W. (editor) 1999. Current Research 1998. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Mineral Resource Report 99-4, 163 p.
This report contains the following papers:
S.M. Barr, C.E. White, M.J. McLeod Geology of the Silurian Kingston terrane, southern New Brunswick.

S.C. Johnson ^{40}Ar/^{39}Ar dating of detrital muscovite from post-Viséan (Carboniferous) sandstones in southeastern New Brunswick.

J.P. Langton, P.G. Banks, R. van de Poll The EXTECH II Geoscience Database Viewer (CD-ROM), Bathurst Mining Camp, northern New Brunswick, Canada (Mineral Resource Report 99-5).

R.F. Miller Report of *Gyracanthus* (Chordata: Acanthodii) and other Upper Carboniferous fish from the Minto Formation, New Brunswick (NTS 21 I/4).

A.A. Seaman Follow-up till geochemistry in the Millville (NTS 21 J/3) map area, York County, New Brunswick.

J.A. Walker Geology of the Taylor Brook massive-sulphide deposit (NTS 21 O/08E), Bathurst Mining Camp, New Brunswick.

R.A. Wilson, L.R. Fyffe, V. McNicoll, N. Wodicka Lithogeochemistry, petrography and geochronology of Ordovician rocks in the Big Bald Mountain area (NTS 21 O/1), Bathurst Mining Camp, New Brunswick.

CARROLL, B.M.W. (editor/rédactrice) 1999. Abstracts, 1999: 24th annual Review of Activities / Résumés, 1999 : 24e rétrospective annuelle des activités. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Information Circular 99-3, 56 p. / Ministère des Ressources naturelles et de l'Énergie du Nouveau Brunswick, Division des ressources minières et de l'énergie, circulaire d'information 99-3, 56 p.

COKER, W.B., PRONK, T., and GARDINER, W.W. 1999. Geochemistry workshop manual. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-8, 113 p.

DOIRON, A. ET BOISVERT, É. 1999. La géochimie de tills de la région de Sevogle (SNRC 21 P/04, moitié ouest), comtés de Northumberland et Gloucester, Nouveau-Brunswick. Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick, Division des ressources minières et de l'énergie, dossier public 99-3, 139 p.

DORION, A. AND BOISVERT, É. 1999. Till geochemistry of the Sevogle area (NTS 21 P/04, west half), Northumberland and Gloucester counties, New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-3, 139 p.

DURSTLING, H. 1999. Science below the surface: underground exploration in New Brunswick nature. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Information Circular 99-1, 4 p.

DURSTLING, H. 1999. La science du sous-sol : exploration souterraines du patrimoine naturel du Nouveau-Brunswick. Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick, Division des ressources minières et de l'énergie, circulaire d'information 99-2, 4 p.

GIGGIE, K.V. 1999. Ground follow-up to the multi-sensor airborne geophysical survey in central Restigouche County, New Brunswick: results and interpretation. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-9, 41 p.

LANGTON, J.P., BANKS, P. and VAN DE POLL, R. 1999. EXTECH II Geoscience Database Viewer, Bathurst Mining Camp, New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Mineral Resource Report 99-5, digital CD.

MERLINI, S.A.A. (compiler) 1999. Available mineral properties in New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Reference 130, 218 p.

MERLINI, S.A.A.(compiler) 1999. New Brunswick Computerized Mineral Occurrence Database (revised 1999). New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-12, digital mineral occurrence files.

NEW BRUNSWICK RESEARCH AND PRODUCTIVITY COUNCIL. 1999. Feasibility study on the development of a value-added process for potash tailings at Potacan Mining Company, New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-2, 70 p.

Parkhill, M.A. and Dickson, M.L. 1999. Till geochemistry of the Nepisiguit Falls map area (NTS 21 P/05), Gloucester and Northumberland counties, northern New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-10, 108 p. and digital data.

Seaman, A.A. 1999. Till geochemistry of the New Brunswick part of the Forest City (NTS 21 G/12) and Fosterville (NTS 21 G/13) map areas, York and Carleton counties: site and geochemical data. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-7, 67 p.

Seaman, A.A. 1999. Till geochemistry of the Millville (NTS 21 J/3) map area, York and Carleton counties, New Brunswick: site and geochemical data. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-11, 83 p. and digital data.

Venugopal, D.V. (compiler) 1999. Selected engineering data: bedrock aggregate samples from the Codys, Petitcodiac, Hillsborough, Moncton and Salisbury map areas (NTS 21 H/13, 14, 15 and 21 I/02, 03), New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-4, 51 p.

Plates (See List of Publications for detailed listings)

MP 97-24A–F (6 plates)

Geology and limestone/dolomite deposits of the (A) Ketepec–South Bay area (part of NTS 21 G/08), (B) Elliott Road–Hammond River–Nauwigewauk area (part of NTS 21 H/05), (C) Green Head Island–Saint John (east & west) area (part of NTS 21 G/08), (D) east Saint John area (part of NTS 21 G/08), (E) Lorneville Peninsula area (part of NTS 21 G/01), (F) Nauwigewauk area (part of NTS 21 H/05. T.C. Webb. Scales: 1:12 500 (B), 1:3 300 (F) and 1:12 500 (all others).

MP 98-72A–C (3 plate)

New Brunswick Standard Oil and Natural Gas Grid Map: (A) oil and natural gas tenure, (B) bituminous shale tenure, (C) underground storage tenure. / Carte normalisée de quadrillage pour le pétrole et gaz naturel du Nouveau-Brunswick : (A) tenure—pétrole et gaz naturel, (B) tenure—schistes bitumineux, (C) tenure—stockage souterrain. New Brunswick Department of Natural Resources and Energy / Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick. Scale / Échelle : 1:500 000.

MP 98-75B–F (5 plates)

Province of New Brunswick oil and natural gas rights / Les droits de la province du Nouveau-Brunswick sur le pétrole et le gaz naturel : (B) Fredericton, (C) Sussex, (D) Moncton, (E) Woodstock, (F) Edmundston. New Brunswick Department of Natural Resources and Energy / Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick. Scale / Échelle : 1:150 000.

MP 98-76C (1 plate)

Province of New Brunswick bituminous shale rights / Les droits de la province du Nouveau-Brunswick sur les schistes bitumineux : (C) Sussex. New Brunswick Department of Natural Resources and Energy / Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick. Scale / Échelle : 1: 150 000.

MP 98-77C–D (2 plates)
Province of New Brunswick underground storage rights / Les droits de la province du Nouveau-Brunswick sur le stockage souterrain : (C) Sussex, (D) Moncton. New Brunswick Department of Natural Resources and Energy / Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick. Scale / Échelle : 1:150 000.

MP 99-1 (1 plate)
Geology of the Upsalquitch Forks area (NTS 21 O/10), Restigouche County, New Brunswick K.V. Giggie. Scale: 1:20 000.

MP 99-2 (1 plate)
Geology of the Kedgwick area (NTS 21 O/11), Restigouche County, New Brunswick K.V. Giggie. Scale: 1:20 000.

MP 99-3 (1 plate)
Geology of the Atholville area (NTS 21 O/15). K.V. Giggie. Scale: 1:20 000.

MP 99-4 (1 plate)
Geology of the west half of the Charlo area (NTS 21 O/16), Restigouche County, New Brunswick. K.V. Giggie. Scale: 1:20 000.

MP 99-6 to 99-9 (4 plates)
Géochimie de la fraction <0.063 mm du till; éléments / Geochemistry of the <0.063 mm fraction of till; elements: (99-6) Cu, Pb, Zn, Au, Ag, As, W, Sb, Mo; (99-7) Br, Ca, Ce, Cs, Eu, Ga, Hf, Ho, La, Lu, Na, Nd; (99-8) Co, Ni, Cr, U, Ba, Nb, Rb, Sr, Fe; (99-9) Sc, Sm, Ta, Tb, Th, V, Y, Yb, Zr. A. Doiron, É. Boisvert. Échelle / Scale: 1:50 000.

MP 99-11 (1 plate)
Selected engineering data: bedrock aggregate samples from the Codys, Petitcodiac, Hillsborough, Moncton, and Salisbury map areas (NTS 21 H/13, 14, 15 and 21 I/02, 03), New Brunswick. D.V. Venugopal. Scale: 1:250 000.

MP 99-12A to 99-16A (5 plate)
Cu, Ni, Co content of stream sediments in part of Restigouche County, New Brunswick / Teneur en Cu, Ni et Co des échantillons de sédiments fluviatiles d'une partie du comté de Restigouche, Nouveau-Brunswick (21 O/11; part of / une partie de 21 O/10, 14, 15, 16). A.G. Pronk, P.W.B. Friske. Scale / Échelle : 1:50 000.

MP 99-12B to 99-16B (5 plate)
Ni, Cr, V content of stream sediments in part of Restigouche County, New Brunswick / Teneur en Ni, Cr et V des échantillons de sédiments fluviatiles d'une partie du comté de Restigouche, Nouveau-Brunswick (21 O/11; part of / une partie de 21 O/10, 14, 15, 16). A.G. Pronk, P.W.B. Friske. Scale / Échelle : 1:50 000.

MP 99-17 to 99-23 (7 plates)
Bedrock geological compilation maps, southern New Brunswick (NTS 21 H/04, 05, 06, 11, 12, 13, 14). M. McLeod and S.C. Johnson. Scale: 1:50 000.

MP 99-24 (1 plate)
Figure 8. Airborne interpretation of the Upsalquitch Forks–Popelogan–Charlo River area (parts of 21 O/10, 15, 16). Interpretation by K. Giggie. Scale: 1:50 000.

MP 99-25 and -26 (2 plates)
Bedrock geological compilation maps, southern New Brunswick (NTS 21 H/10, 15). M. McLeod and S.C. Johnson. Scale: 1:50 000.

MP 99-27A–B (2 plates)
(A) Location of basal till samples and ice-flow indicators; (B) Geological compilation, Nepisiguit Falls map area (NTS 21 P/05), Gloucester and Northumberland counties. M.A. Parkhill and M.L. Dickson. Scale: 1:50 000.

MP 99-28A–B (2 plates)
Photogrammetric study of (A) coastline / (B) shoreline changes along Castalia Beach, Grand Manan Island, New Brunswick: 1945–1984. D. Bérubé. Scale: 1:10 000.

MP 99-29A–B (2 plates)
Étude photogrammétrique du déplacement de la ligne de côte (A) / rivage (B) de la flèche de Maisonnette, baie de Caraquet, Nouveau-Brunswick : 1944–1991. (Portion de SNRC 21 P/15). D. Bérubé. Échelle : 1:50 000.

MP 99-30 (1 plate)
Geology of the Eel River area (part of NTS 21 G/13h), York and Carleton counties, New Brunswick. L.R. Fyffe. Scale: 1:20 000.

MP 99-32A–B (2 plates)
(A) Major mineral developments in New Brunswick / (B) Principaux gisements en voie d'exploitation au Nouveau-Brunswick. B.M.W. Carroll (compiler/compilatrice). Scale / Échelle : 1:600 000.

MP 99-33A–B (2 plates)
Compilation of (A) Bouguer gravity / (B) Free-air gravity data for New Brunswick. H.H. Hassan. Scale: 1:1 000 000

Conference Papers and Posters Presented by Division Staff

ALLABY, G.M., BROSTER, B.E. and PRONK, A.G. 1999. Late Wisconsinan glacial movement in the Petitcodiac map area, southeastern New Brunswick. Paper presented at the Colloquium and Annual General Meeting of the Atlantic Geoscience Society, Amherst, Nova Scotia, February 5–6, 1999. *In* Atlantic Geology, **35**: 86.

ALLABY, G.M., PRONK, A.G., and BROSTER, B.E. 1999. Till provenance study in the Petitcodiac area, southeastern New Brunswick. Canadian Quaternary Association–Canadian Geomorphological Research Group meeting, University of Calgary, Alberta. Program and abstracts, p. 2.

Barr, S.M., White, C.E., and McLeod, M.J. 1999. A new geological map of the Kingston terrane, southern New Brunswick (abstract). Poster presented at the Colloquium and Annual General Meeting of the Atlantic Geoscience Society, Amherst, Nova Scotia, February 5–6, 1999. *In* Atlantic Geology, **35**: 87.

Carroll, B.M.W. (editor / rédactrice) 1998. Abstracts, 1999: 24th annual Review of Activities / Résumés, 1999: 24e Rétrospective annuelle des activités. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division / Ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick, Division des ressources minières et de l'énergie, Information Circular 99-3, 56 p. This volume contains the following abstracts:

G.M. Allaby, A.G. Pronk, B.E. Broster Late Wisconsinan glacial movement in the Petitcodiac map area (NTS 21 H/14), southeastern New Brunswick / Déplacement glaciaire du Wisconsinien supérieur dans le secteur cartographique de Petitcodiac (SNRC 21 H/14), sud-est du Nouveau-Brunswick.

S.M. Barr, E. Grace, B.V. Miller, C.E. White Geology of the southwestern Kingston terrane and adjacent parts of the Brookville terrane, southern New Brunswick / Géologie du sud-ouest du terrane de Kingston et de parties adjacentes du terrane de Brookville, sud du Nouveau-Brunswick.

S.M. Barr, O.D. Gaskill, J.R. Price Petrology of the St. Stephen gabbroic pluton / Pétrologie du pluton gabbroïque de St. Stephen.

D. Bérubé, P. Whalen, J. Godin Establishment, development and degradation of a spruce stand, Cocagne Island, southeast coast of New Brunswick / Établissement, développement et dégradation d'un peuplement d'épinettes, île de Cocagne, côte sud-est du Nouveau-Brunswick.

J.I. Carroll Bedrock geology of the Kedgwick map area (NTS 21 O/11E), northern New Brunswick / Géologie du substrat rocheux du secteur cartographique de Kedgwick (SNRC 21 O/11est), nord du Nouveau-Brunswick.

M.L. Dickson, M.A. Parkhill Quaternary geology and glacial dispersal in the Charlo area, northern New Brunswick / Géologie du Quaternaire et dispersion glaciaire dans le secteur de Charlo, nord du Nouveau-Brunswick.

P.W.B. Friske, S.J.A. Day, M.W. McCurdy, A.G. Pronk, M.A. Parkhill, R. Boldon Stream-sediment follow-up and orientation work in the Restigouche area, northern New Brunswick / Travaux d'orientation et de suivi sur des sédiments fluviatiles dans le secteur de Restigouche, nord du Nouveau-Brunswick.

L.R. Fyffe Base metal and gold potential of the Eel River area, southwestern Miramichi terrane, New Brunswick / Potentiel aurifère et métallifère (métaux communs) du secteur d'Eel River, sud-ouest du terrane de Miramichi, Nouveau-Brunswick.

A. Hamilton The Heath Steele mine (1954–1999), Bathurst Mining Camp, New Brunswick / Mine Heath Steele (1954–1999), camp minier de Bathurst, Nouveau-Brunswick.

S.C. Johnson Bedrock geology of the Long Reach area, Kings County, southern New Brunswick (parts of NTS 21 G/8f, g and h) / Géologie du substrat rocheux du secteur de Long Reach, comté de Kings, sud du Nouveau-Brunswick (parties des secteurs 21 G/8f, g et h).

F. Kiss Airborne electromagnetic, magnetic, gamma-ray spectrometer survey in the Kedgwick area, northwestern New Brunswick / Levé électromagnétique, magnétique et radiométrique, dans le secteur de Kedgwick, nord-ouest du Nouveau-Brunswick.

J.P. Langton Geology and mineral occurrences of the South Charlo River area (NTS 21 O/16d), Restigouche County, New Brunswick / Géologie et venues minérales du secteur de la rivière Charlo Sud (SNRC 21 O/16d), comté de Restigouche, Nouveau-Brunswick.

D. Lavoie, D. Lebel, S. McCutcheon, S. Coleman-Sadd, A. Tremblay, O.S. Hersi, S. Castonguay, M. Rocher, K. Lauzière, J. Gagnon, and Y. Lemieux Appalachian foreland and platform architecture in Quebec, New Brunswick and Newfoundland: an up-to-date NATMAP contribution to the Geological Bridges of Eastern Canada / Architecture de la plate-forme et du bassin avant-pays des Appalaches au

Québec, au Nouveau-Brunswick et à Terre-Neuve: contribution actuelle de CARTNAT aux Ponts géologiques de l'Est du Canada.
D.R. Lentz, S.R. McCutcheon, J.I. Carroll The McKenzie Gulch copper–skarn deposits, northern New Brunswick: exploration criteria / Gîtes de skarns cuprifères de la ravine McKenzie, nord du Nouveau-Brunswick : critères d'exploration.
M. Malo, C. Pelchat, B. Dubé, A. Chagnon Contrasting styles of gold mineralization along the Grand Pabos–Restigouche fault system: implication for Carlin-like Au mineralization in the southwestern Gaspé Appalachians / Types différents de minéralisations auriféres le long du système de failles de Grand Pabos–Restigouche: répercussions en ce qui concerne la minéralisation aurifère de type Carlin dans le sud-ouest des Appalaches gaspésiennes.
M. McLeod, R.K. Pickerill Geology of the Hampstead–Beulah area, southern New Brunswick / Géologie du secteur de Hampstead–Beulah, sud du Nouveau-Brunswick.
S. Merlini, M. McLeod, J. Walker New Brunswick Mineral Occurrence Database / Base de données informatisée des gisements minéraux du Nouveau-Brunswick.
K.H. Poulsen Carlin-type gold deposits and possible Canadian analogues / Gîtes aurifères de type Carlin et gisements analogues possibles au Canada.
T. Pronk, M.A. Parkhill, R. Boldon Follow-up till geochemistry in the Boland Brook area, northwestern New Brunswick (NTS 21 O/11E) / Géochimique de suivi du till dans le secteur du ruisseau Boldand, nord-ouest du Nouveau-Brunswick (SNRC 21 O/11E)
A.A. Seaman Till geochemistry of the Woodstock map area (NTS 21 J/4), Carleton County, west-central New Brunswick / Géochimie du till du secteur cartographique de Woodstock (SNRC 21 J/4), comté de Carleton, centre-ouest du Nouveau-Brunswick.
C. St. Peter Carboniferous geology of the northwestern margin of the New Brunswick Platform and Marysville Subbasin / Géologie carbonifère de la marge nord-ouest de la plate-forme du Nouveau-Brunswick et du sous-bassin de Marysville.
M.D. Thomas Gravity signatures of massive sulphide deposits, Bathurst Mining Camp, New Brunswick / Signatures gravimétriques des gîtes de sulfures massifs, Camp minier de Bathurst, Nouveau-Brunswick.
J.A. Walker, J. Bannister Preliminary investigation of the Nash Creek Zn–Pb–Ag deposit (NTS 21 O/16E), New Brunswick / Étude préliminaire du gîte de Zn–Pb–Ag de Nash Creek (SNRC 21 O/16E), Nouveau-Brunswick.
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R.A. Wilson Geology of the Popelogan Lake and Lost Pine Lake areas (NTS 21 O/15a and 15b), Restigouche County, New Brunswick / Géologie des secteurs du lac Popelogan et du lac Lost Pine (SNRC 21 O/15a et 15b), comté de Restigouche, au Nouveau-Brunswick.

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MCLAUGHLIN, K.J. and LENTZ, D.R. 1999. Petrology and geochemistry of the Benjamin River South porphyry Cu deposit, northeastern New Brunswick (abstract). Paper presented at the Colloquium and Annual General Meeting of the Atlantic Geoscience Society, Amherst, Nova Scotia, February 5–6, 1999. *In* Atlantic Geology, **35**: 98.

WILSON, R.A., MCCUTCHEON, S.R., FYFFE, L.R., and VAN STAAL, C.R. 1999. Revised stratigraphic nomenclature for the Bathurst Mining Camp, northern New Brunswick (abstract). Paper presented at the Colloquium and Annual General Meeting of the Atlantic Geoscience Society, Amherst, Nova Scotia, February 5–6, 1999. *In* Atlantic Geology, **35**: 107.

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LENTZ, D.R. 1999. Deformation-induced mass transfer in felsic volcanic rocks hosting the Brunswick No. 6 massive-sulfide deposit, New Brunswick: geochemical effects and petrogenetic implications. The Canadian Mineralogist, **37**: 489–512.

LENTZ, D.R. 1999. Petrology, geochemistry and oxygen isotope interpretation of felsic volcanic and related rocks hosting the Brunswick 6 and 12 massive sulfide deposits (Brunswick Belt), Bathurst Mining Camp, New Brunswick, Canada. Economic Geology **94**: 57–86.

CHAPTER 2.
MINERAL EXPLORATION IN NEW BRUNSWICK

METALLIC MINERALS

Northern New Brunswick

The annual telephone poll, taken in October, indicates that exploration expenditures in the northern half of the Province for 1999 are approximately $7 000 000, whereas $10 300 000 was reported for 1998. These figures compare quite closely with figures for all of New Brunswick—forecast 1999 expenditure was approximately $7 400 000 and the final 1998 expenditures were approximately $10 000 000 (Source: Natural Resources Canada). Northern New Brunswick generally accounts for about 90% of the total exploration expenditure in the Province. Statistics from the database of the Province's Recorder indicates that the number of new claims recorded in northern New Brunswick during 1999 was 1343 and the number of claims in effect at year's end was 12 368.

As in past years, most of the exploration activity in northern New Brunswick was focused on base metals in the Bathurst Mining Camp. The active major companies were Breakwater Resources Ltd. and Noranda Inc., which together spent about $6 500 000. Teck Exploration Ltd., which was active in 1998, closed its office in Bathurst, effective the first of August. The active juniors were Black Bull Resources Inc., Chapleau Resources Limited, Eastmain Resources Inc., Fancamp Resources Ltd., Lewis Brook Resources Ltd., Northeast Exploration Services Limited, Omni Mines Ltd., PGE Resource Corporation and Slam Exploration Ltd., which collectively spent approximately $500 000. All but three of these companies, Chapleau Resources Limited, Lewis Brook Resources Ltd. and PGE Resource Corporation received funding under the New Brunswick Exploration Assistance Program (NBEAP) for junior mining firms.

Major Companies

Noranda Inc. accounts for most of the exploration expenditures in northern New Brunswick. In 1999, the company spent $6 470 000 within the Bathurst Mining Camp, up $1 600 000 over 1998. Approximately, $1 000 000 of this total was spent on two-dimensional seismic surveys in the Brunswick belt. From east to west, Noranda's land holdings are concentrated in five belts: Key Anacon–Lawson Brook belt, Brunswick–Portage River belt, Heath Steele–Mountain Brook belt, Camel Back–Wedge belt and Upsalquitch–Half Mile Lakes belt (Figure 6: 1–5). Notably, Noranda dropped a large number of claims in the Forty Four Mile Brook–Rogers Lake area (Figure 6: 6) and staked only 81 new claims in seven blocks this year, all of them in the Bathurst Mining Camp.

In the Key Anacon–Lawson Brook belt (Figure 6: 1), Noranda drilled three holes, totalling 1890 m, to test subtle magnetic targets beneath Carboniferous cover rocks. In the Brunswick–Portage River belt (Figure 6: 2), 15 holes were drilled near the Brunswick No.12 mine, 8 from surface totalling 10 145 m and 7 from underground totalling 1936 m. Another 10 holes, totalling 5325 m, were drilled outside the mine area. Also, more than 150 shallow holes, totalling roughly 2000 m, were drilled in lieu of trenching to

Legend (Figure 6)

1. Claims, Key Anacon–Lawson Brook belt (Noranda Inc.)
2. Claims, Brunswick–Portage River belt (Noranda Inc.)
3. Claims, Heath Steele–Mountain Brook belt (Noranda Inc.)
4. Claims, Camel Back–Wedge belt (Noranda Inc.)
5. Claims, Upsalquitch–Half Mile Lakes belt (Noranda Inc.)
6. Claims, Forty Four Mile Brook–Rogers Lake area (Noranda Inc.)
7. Claims, Wildcat (Northeast Exploration Services Limited)
8. Claims, Caribou North (Northeast Exploration Services Limited)
9. Claims, Tingley Brook (Eastmain Resources Inc.)
10. Claims, Sandburn (Eastmain Resources Inc.)
11. Claims, Railroad (Eastmain Resources Inc.)
12. Mining Lease, Captain North Extension deposit (Stratabound Minerals Corp.)
13. Claims, Chester (Northeast Exploration Services Limited); Chester (Bathurst Silver Mines)
14. Claims, Little Sevogle–Northeast (Wayne Carroll)
15. Claims, GIS (Northeast Exploration Services Limited)
16. Claims, Mount Baird (Northeast Exploration Services Limited)
17. Claims, Bills Lake (PGE Resource Corporation)
18. Claims, Nepisiguit Brook (Major General Resources Limited)
19. Claims, Sewell Brook (Chapleau Resources Ltd.)
20. Claims, Lewis Brook (Slam Exploration Ltd.)
21. Claims, Clarinda (Slam Exploration Ltd.)
22. Claims, Turgeon Deposit (Heron Mines Ltd.)
23. Claims, Copper Stake, Tower Hill (Kevin Smith)
24. Claims, Noel Grid (Lorenzo Noel)
25. Claims, Simpson (Michael Smith)
26. Claims, Malachite (Log House Construction Ltd.)
27. Claims, Simpsons Gulch, Royal Vault, Boland Brook, Boland Brook Centre, Indian Brook, Burntland Brook, Ritchie Brook, McKenzie Lake (A. Wayne Lockhart)
28. Claims, Golden Ridge (Freewest Resources Canada Inc.)
29. Claims, Clarence Stream (Freewest Resources Canada Inc.)
30. Claims, Browns Mountain (Fancamp Resources Inc.)
31. Claims, Dead Creek (Sheila Watters)
32. Claims, Armstrong Brook (Pro-Max Resources Inc.)
33. Claims, Springfield (Pat Marr)
34. Claims, Digdeguash (Peter Fenety)
35. Claims, Albright Brook (PGE Resource Corporation)
36. Claims, Jordan Mountain (Phelps Dodge Corporation of Canada Ltd.)
37. Millstream potash deposit
38. Claims, Hicksville (Goldcorp Inc.)
39. Claims, Bonney Road (J.D. Irving Limited)
40. Claims, French Village (Kingsway Materials Ltd.)
41. Claims, northwest of St. George (McMinn Pit Ltd.)
42. Claims, Taylor Village (Avard Hudgins)
43. Claims, Petitcodiac River (Avard Hudgins)
44. Peat exploration licence (Le Groupe Qualité Lamèque ltée)
45. Peat exploration licence (Compagnie de Tourbe Fafard ltée)
46. Peat exploration licence (Premier Horticulture ltée)
47. Peat exploration licence (La Mousse Acadienne (1979) ltée)
48. Peat lease (Jiffy Products (N.B.) Ltd.)
49. Oil and natural gas licences to search (Corridor Resources Inc.)
50. Oil and natural gas lease (Irving Oil Limited)
51. Oil and natural gas licence to search (Jean Mariadassou)
52. Oil and natural gas licences to search (MariCo Oil and Gas Corporation)
53. Oil and natural gas licences to search (J.A. Seglund, Inc.)
54. Oil and natural gas licences to search (RHT Enterprises Ltd.)
55. Bituminous shale development permits (A.A. (NB) Inc.)
56. Bituminous shale licence to search (Shell Canada Limited)
57. Underground storage exploration licence St. Clair Pipelines (1996) Ltd.)
58. Underground storage exploration licences (Intragaz)

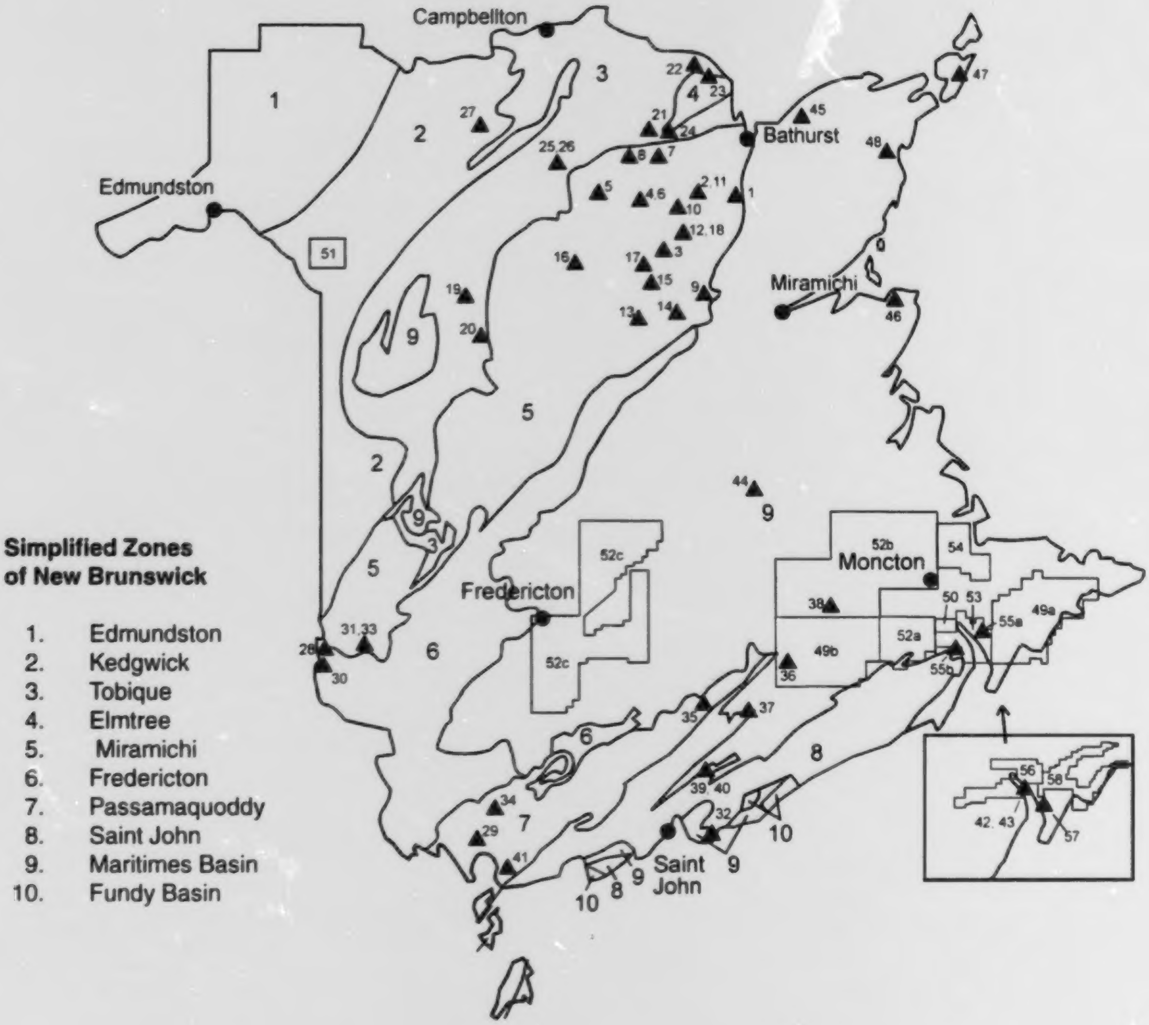

Campbellton
Edmundston
Bathurst
Miramichi
Moncton
Fredericton
Saint John
Simplified Zones of New Brunswick
1. Edmundston
2. Kedgwick
3. Tobique
4. Elmtree
5. Miramichi
6. Fredericton
7. Passamaquoddy
8. Saint John
9. Maritimes Basin
10. Fundy Basin
1
2
3
4
5
6
7
8
9
10
51
52a
52b
52c
49a
49b
50
53
54
55a
55b
56
57
58
42, 43

Figure 6. Some exploration properties in New Brunswick, 1999.

help elucidate the bedrock geology in the Brunswick–Portage River belt. In addition, five two-dimensional seismic lines were shot in this belt. In the Heath Steele–Mountain Brook and Camel Back–Wedge belts (Figure 6: 3, 4), no significant amount of work was done in 1999. In the southern part of the Upsalquitch–Half Mile Lakes belt (Figure 6: 5), ground preparations were made to extend the Halfmile Lake three-dimensional seismic survey to the southwest. However, the survey will not be shot until 2000. Deep drilling continues at Halfmile Lake to test the seismic targets identified in 1998. To date, 12 holes, including extensions to existing holes, have been completed bringing this year's total meterage to 15 597 m. In the northern part of the Upsalquitch–Half Mile Lakes belt, five scattered holes totalling 654 m have been drilled and another 800 m were planned before the end of 1999.

Breakwater Resources Ltd. and its wholly owned subsidiary, CanZinco Ltd., conducted limited exploration (totalling approximately $50 000) in two areas during 1999, namely on the Wildcat and Caribou North properties (Figure 6: 7–8). The work included, respectively, 13.2 km and 4.7 km of induced polarization surveying.

Junior Companies

Eastmain Resources Inc. spent approximately $230 000 this year making it the second highest spender after Noranda Inc. Early in the year, Eastmain Resources Inc. focused on its Tingley Brook and Sandburn Brook properties (Figure 6: 9–10), in partnership with Bubbee Ventures Inc., which contributed $150 000 toward the exploration program. Nine holes, totalling 1825 m, were drilled—six on Tingley Brook to test coincident soil geochemical and electromagnetic anomalies over favourable stratigraphy, and three on Sandburn Brook to test the strike extension of a known massive sulphide occurrence. One of the Tingley Brook holes cut 65 m of disseminated sulphides adjacent to a large magnetic anomaly in the southern part of the property.

Eastmain Resources Inc. also explored its wholly owned Railroad property (Figure 6: 11). Two grids, totalling more than 100 line kilometres, were cut on the Railroad property in 1998. Detailed mapping, ground geophysics (induced polarization and magnetometer) and trenching outlined three promising zones on this large property, namely Island Lake, Captain West and Railroad. At Island Lake, a 1600-m-long alteration zone at the Nepisiguit Falls–Flat Landing Brook contact was delineated by trenching and induced polarization. This zone was one of the stops on the annual spring field trip of the New Brunswick Prospectors and Developers Association. At the Railroad zone, located south of Captain West, a 1000-m-long induced polarization anomaly was delineated over strongly altered Nepisiguit Falls quartz porphyry that is overlain to the north by an iron formation and mineralized Flat Landing Brook fragmental rocks (BHP Minerals Canada Limited's Railroad discovery).

In mid-September, Eastmain Resources Inc. announced that it has made an agreement in principle with Stratabound Minerals Corp. regarding mining of the Captain North Extension (CNE) deposit (Figure 6: 12). In the early 1990s, Stratabound mined 39 000 t of ore from CNE and had it custom milled at Heath Steele. It turned out that the grade of the mill feed (i.e., 11.1% Zn, 4.7% Pb and 150.86 g/t Ag) was higher than the open-pit reserve estimate; thus, Eastmain considers the remaining open-pit reserve (i.e., approx. 75 300 t of 7.3% Zn, 2.6% Pb and 89.1 g/t Ag) to be understated. With the closure of Heath Steele in 1999, future custom milling will have to be done at Brunswick No.12.

Black Bull Resources Inc. conducted an induced polarization survey on the Chester property (Figure 6: 13) and drilled two holes, totalling 550 m, to further test the lead–zinc zone near the old Chester Mines workings. Two shallow holes, totalling about 250 m, were also drilled on the Little Sevogle property (Figure 6: 14) and one hole (150 m) was drilled on the GIS precious metal property (Figure 6: 15), which is under option from Northeast Exploration Services Limited.

Northeast Exploration Services Limited carried out preliminary exploration on its property in the Portage Lakes area (Figure 6: 16), south of the Restigouche deposit. Notably, the southern parts of this claim group, and an adjacent one held by PGE Resource Corporation, touch upon the recently proposed protected area (NB Central Highlands) adjacent to Mount Carleton Park. There are three proposed protected areas in northern New Brunswick.

PGE Resource Corporation recently completed a drill hole on its Bills Lake property (Figure 6: 17), north of Chester. Core was being logged in the latter part of 1999 so no results have been released.

Major General Resources Limited received an NBEAP grant to conduct further work on its Nepisiguit Brook property (Figure 6: 18) but did not carry out any work before the year's end.

Other listed companies that did not work on their claims in the Bathurst Mining Camp in 1999 are: Freewest Resources Canada Inc., Mountain Lake Resources Inc., NovaGold Resources Inc., Stratabound Minerals Corp., and Teck Exploration Ltd.

Outside the Bathurst Mining Camp, only four junior companies carried out work or expected to carry out work in 1999, namely, Chapleau Resources Ltd., Lewis Brook Resources Ltd., Slam Exploration Ltd., and Fancamp Resources Ltd. Earlier in the year, Chapleau Resources Ltd. drilled four more holes, totalling approximately 400 m, on its Sewell Brook base metal property (Figure 6: 19). However, later in the summer the company permanently closed the Plaster Rock field office and moved its equipment back to Cranbrook, British Columbia. Lewis Brook Resources Ltd. and partner Miramichi Minerals Ltd. also drilled four holes, totalling 640 m, earlier in the year on a base-metal property south of Mount Costigan (Figure 6: 20).

Slam Exploration Ltd. has nearly completed the process to become listed on the Alberta Stock Exchange. Once complete, the company plans to use its NBEAP grant to help drill off the Clarinda gold property (Figure 6: 21) near Lower Tetagouche Lake, which saw an extensive trenching program in 1998.

In 1998, Fancamp Resources Ltd. entered into a joint-venture agreement with Heron Mines Ltd. on the Turgeon Cu–Zn property (Figure 6: 22) near Belledune. A new grid was cut perpendicular to existing grids and a Quantec induced polarization survey was carried out that picked up the known mineralized zones (powerline and 100 m zinc zones), as well as a deeper anomaly just beyond the limits of existing drilling. Fancamp plans to test this anomaly with two or three drill holes but did not raise sufficient money to carry out this work before year's end.

Prospectors

Fernand Robichaud and Kevin Smith found massive sulphide boulders in an esker west of Madran (Figure 6: 23), one of which contains high-grade copper. This boulder almost certainly came from the nearby Fournier Group but its bedrock source has not yet been identified.

Lorenzo Noel conducted additional trenching on his Arleau Brook property (Figure 6: 24) and uncovered a quartz zone near the location of the gold-bearing quartz boulders (assaying up to 29 g/t Au) that he found in 1998.

Mike Smith and George Chilian of Metalore Resources Limited carried out trenching and sampling on gold claims in the Simpsons Field area (Figure 6: 25) of the Tobique–Chaleurs Belt. The Lower Devonian Ramsay Brook gabbro is highly altered, locally sulphide rich and should have excellent potential to host porphyry Cu–Au mineralization.

Rufus Smith (Log House Construction Ltd.) held a property in the headwaters of Ramsay Brook along Highway 180 (Figure 6: 26), which also has excellent potential for porphyry Cu–Au mineralization. This property has been trenched but never drill tested.

In the latter part of 1998, Wayne Lockhart (Kedgwick Syndicate) acquired more than 500 claims to encompass part of the huge Ni–Co stream-sediment anomaly (up to 700 ppm Ni) that is east of Kedgwick

(Figure 6: 27). The Syndicate includes Omni Mines Ltd., a private company that Wayne founded back in 1973, and a number of individual investors. In 1999, a detailed stream-sediment survey, comprising 700 samples collected at 500 m spacing, was completed with the help of NBEAP funding to Omni Mines Ltd. This survey apparently verified that the anomaly exists but the results are not yet public. The bedrock source of this Ni–Co anomaly remains unidentified.

SOUTHERN NEW BRUNSWICK

Exploration in southern New Brunswick was targeted mainly on precious metals and base-metal sulphides with emphasis on gold. Exploration continued to be active for industrial minerals and energy-related resources. Exploration expenditures are estimated to be $740 000 for 1999, assuming that southern New Brunswick accounted for 10% of the total provincial expenditure reported by Natural Resources Canada ($7 400 000: forecast for 1999). The Provincial Recorder's database indicates that the number of claims recorded in 1999 was 428 and the number of claims in effect at year's end was 2516.

The high potential for economic gold deposits, which are associated with a variety of geological environments in the southern part of the province, is becoming widely recognized. One of the most important is the recent discovery of impressive gold mineralization associated with certain Late Paleozoic granitoid rocks in a contact metasomatic environment. This discovery has reinforced previously proposed models suggesting that the contact zone of these intrusions provides excellent gold exploration targets. In a regional context, many of the gold-bearing vein, skarn and porphyry systems in this area appear to be associated directly or indirectly with broadly similar intrusions indicating the presence of an extensive, genetically related gold district. Other significant new gold discoveries associated with Hercynian fold-thrust belts that affect Neoproterozoic and/or Carboniferous rocks along the south coast of the province have also been located, highlighting the potential for gold in these environments as well.

Over the past year, Freewest Resources Canada Inc. has conducted exploration on two promising gold properties. On its Golden Ridge property (Figure 6: 28) in the Canterbury area, gold sourced in high-level, intermediate intrusions and enriched along a major fault zone occur within an Ordovician felsic to intermediate volcanic pile. The company completed a ten-hole diamond-drilling program, following up on three main targets outlined by soil geochemistry and trenching. In the first target area, a broad mineralized zone up to 60 m wide contained numerous gold intersections, including one with 1.13 g/t Au over 23.0 m and another with 4.40 g/t Au over 6.3 m within a 13.4 m section that yielded 2.50 g/t Au. In the second area, a similar zone was found with up to 0.84 g/t Au over 23.7 m. The third area also returned several good intersections, the highest of which was 1.10 g/t Au over 6.6 m.

Freewest also acquired the Clarence Stream gold property (Figure 6: 29) that was found by Reginald Cox in 1998 after following up a government, regional stream-sediment sampling survey. There, gold occurs in a contact metasomatic environment associated with felsic to intermediate intrusions of the Saint George Batholith. Prospecting has revealed that disseminations and veinlets of gold occur within the intrusions and in metasedimentary rocks along the contact, and in samples of late quartz veins containing significant visible gold. Samples from float, subcrop and outcrop returned values of 13 g/t Au averaged over 32 samples with values ranging from 0.09 g/t to 76.8 g/t over a distance of several kilometres along the contact. An exploration program on this property, which now contains 206 claims, consisted of grid work and a soil sampling survey in anticipation of trenching and diamond-drilling programs.

Fancamp Resources Ltd. conducted preliminary work including prospecting, trenching, reconnaissance induced polarization, and soil-sampling surveys on its Browns Mountain property (Figure 6: 30) in the Canterbuty area, east of Freewest's Golden Ridge property. The property staddles two major fault zones and contains altered intermediate to felsic intrusions like those in the vicinity of Golden Ridge. Several samples of float yielded anomalous gold, and trenching uncovered numerous silicified and sulphide-rich, angular boulders with arsenopyrite and gold enrichment. These are very similar to mineralized samples from Golden Ridge.

Several other companies/prospectors have been conducting grass-roots exploration for gold in the Canterbury area with some promising results. For example, on the Dead Creek claim group (Figure 6: 31), John O'Neil found float containing 2.8 g/t Au with anomalous antimony. Similar locally derived, high-grade, massive sulphide boulders found previously near this locality also have been found near major gold occurrences in the region.

Pro-Max Resources Inc. has substantially enhanced the exploration potential on its Armstrong Brook property (Figure 6: 32) in the Hercynian thrust–fold belt south of Saint John. In addition to 3-m- and 0.46-m-long chip samples (grading 7.75 g/t and 14.2 g/t, respectively) from one thrust zone, numerous and widely distributed outcrops with high-grade visible gold were found along strike for about 3.5 km. Two main mineralized zones within this area returned assays up to 53.5 g/t and 23.1 g/t. Further, the highest airborne radiometric anomaly is associated with this mineralized structure. In this region, airborne radiometric anomalies are generally associated with gold deposits.

Other than the gold environments mentioned above, there are some new areas that warrant investigation, including alluvial/fluviatile sedimentary sequences in Carboniferous strata and subaerial volcanic terrains in Neoproterozoic rocks along the south coast. It has been shown this year that there may have been a widespread, auriferous mineralizing event associated with hot spring activity during the latter part of the Early Carboniferous in addition to paleoplacer potential. Preliminary work by Southfield Resources Ltd. and Pro-Max Resources Inc. has found evidence of epithermal, high-sulphidation styles of alteration associated with sintery jasperoid and barite veining as well as with stratiform, silica-rich horizons. Historical research by these companies indicates extensive exploration and some production from these environments in the past century.

Ongoing work on epithermal gold systems within Neoproterozoic terrains in southeastern Newfoudland highlights the potential for similar deposits in correlative terrains in southern New Brunswick. Although there are numerous indications that this type of mineralization could be present in New Brunswick, little work has been conducted toward that end.

Some exploration for base metal sulphides was conducted in the southern part of the Province. Government personnel involved in a 1:10 000 scale bedrock geological mapping survey, in conjuncton with Patt Marr, have succeeded in outlining the potential productive horizon for volcanogenic massive sulphide deposits on his Springfield property (Figure 6: 33) near Canterbury. Massive sulphide clasts and massive and disseminated mineralization in breccias are associated with an extensive, Lower Ordovician, mainly felsic volcanic unit that contains maroon iron formation. Peter Fenety, on his Digdeguash property (Figure 6: 34) west of St. George, continued collecting samples in the area for geochemical analysis. Stratiform copper- and zinc-bearing basalt flows on the property contain anomalous platinum group elements, cobalt and gold, which could represent part of an extensive mineralizing event active during Late Silurian time in southwestern New Brunswick.

Other active companies include PGE Resource Corporation and Phelps Dodge Corporation of Canada Ltd. PGE continued to work on the Albright Brook property (Figure 6: 35) in the Annidale area that has high potential for economic gold and base-metal sulphide deposits. Work included a large soil-sampling survey, a magnetic and VLF electromagnetic survey, prospecting and rock sampling. Phelps Dodge staked claims in the Jordan Mountain area (Figure 6: 36), which also has potential for these commodities. A minor amount of grass-roots exploration was conducted on this property.

Technical Progress Reports

The following Technical Progress Reports were received in 1999:

Report No.	Company	Property	NTS	Release Date
PR10-111	Noranda Inc.	Burntland Lake	21 O/10W	01/15/2001
PR10-112	Noranda Inc.	Pabineau South	21 P/05W	03/18/2001
PR10-113	Eastmain Resources Inc.	Roche Long Lac	21 P/05W	03/15/2001
PR10-114	PGE Resource Corp.	Bills Lake	21 O/01E	08/12/2001
PR10-115	Major General Resources Limited	Hartts Lake	21 P/08W	09/15/2001
PR10-116	Noranda Inc.	Patapedia	21 O/14W	09/27/2001
PR15-012	Lafarge Canada Inc.	Glenvale Gypsum	21 H/14E	06/09/2001
PR15-013	Noranda Inc.	Strachens Lake	21 O/08E	06/11/2001
PR15-014	Noranda Mining and Exploration Inc.	Devils Elbow	21 O/08W	06/11/2001
PR15-015	Murray Brook Resources Inc.	North Kennco Licence	21 O/09W	06/15/2001
PR15-016	CanZinco Ltd.	Rocky Turn	21 O/09E	06/09/2001
PR15-017	Lafarge Canada Inc.	Springhill	21 I/03W	07/15/2001
PR15-018	Marshall Minerals Corp.	Restigouche Project	21 O/09W	07/22/2001
PR15-019	Noranda Inc.	Central Camp	21 O/08E	08/10/2001
PR15-020	Noranda Inc.	Nepisiguit/Mosher	21 O/08E	08/06/2001
PR15-021	Freewest Resources Canada Inc.	Nine Mile Brook	21 O/08E	08/17/2001
PR15-022	Noranda Mining and Exploration Inc.	Halfmile Lake North	21 O/08W	08/05/2001
PR15-023	Heron Mines Ltd.	Turgeon Deposit	21 P/13W	09/02/2001
PR15-024	CanZinco Ltd.	McMaster	21 O/09E	09/15/2001
PR15-025	CanZinco Ltd.	Restigouche Project	21 O/10E	09/15/2001
PR15-026	CanZinco Ltd.	Armstrong	21 O/09E	09/15/2001
PR15-027	Stratabound Minerals Corp.	Taylor Brook	21 O/08E	11/26/2001
PR15-028	Hunter Brook Holdings Ltd.	Key Anacon Mine	21 P/05E	11/23/2001
PR15-029	Teck Corp.	Murray Brook West	21 O/09W	01/04/2002
PR15-030	Teck Corp.	Murray Brook North	21 O/09W	01/04/2002
PR15-031	Noranda Inc.	Indian Lake	21 O/08E	01/06/2002
PR15-032	CanZinco Ltd.	Orvan Brook	21 O/09E	09/03/2001

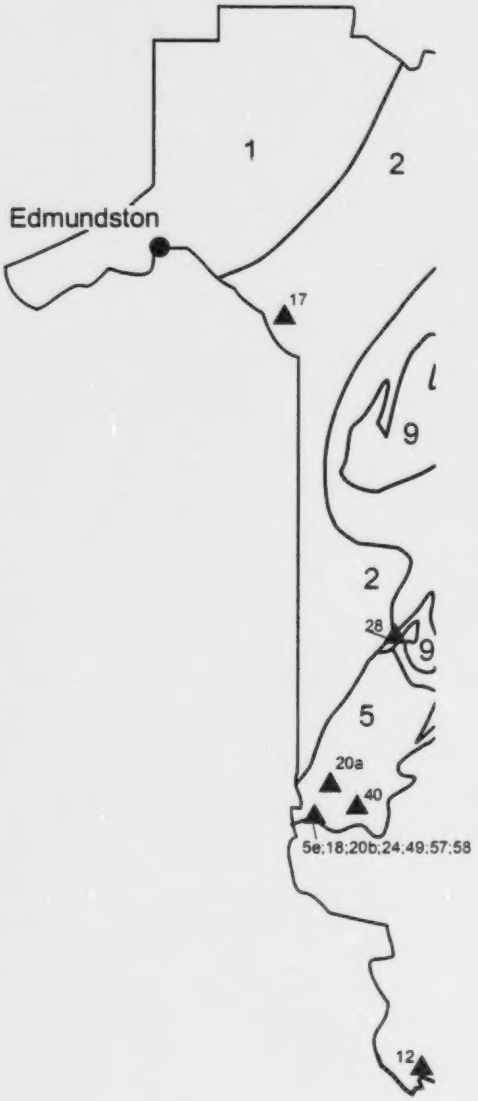
Mineral Exploration Reports of Work

During 1999, 107 reports of work were received by the Recorder in accordance with the *Mining Act*, Chapter M-14.1, S.N.B. 1985. These reports are summarized in tabular form on the following pages and their locations are shown on Figure 7. The name of the company or individual listed for each report of work is that of the holder of the mineral rights. Reports are arranged in the following order: (1) by the geological belt in which the claims are located, (2) alphabetically by company or individual, and (3) alphabetically by property name.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
MATAPÉDIA COVER SEQUENCE					
2. **Bathurst Exploration Ltd.**					
a. Arleau Brook	475231	20	21 O/09E	Sept. 2, 2001	Prospecting; collection and analysis of soil and rock samples.
b. Jacquet	475233	7	21 O/09E	Sept. 13, 2001	Magnetic and VLF surveys.
6. **Black, Don**					
Ramsay Brook	475213	9	21 O/07E	May 23, 2001	Prospecting; VLF survey.
7. **Black, Joey**					
Tetagouche	475272	7	21 O/09E	Nov. 5, 2001	Prospecting; collection and analysis of soil samples.
14. **Donovan, Robert**					
Cessna	475221	2	21 O/15E	Aug. 10, 2001	Grid establishment; prospecting; trenching; VLF-EM survey.
17. **Fahey, Joseph**					
St. Leonard	475220	20	21 O/04E	Aug. 4, 2001	Prospecting; collection and analysis of lithogeochemical samples.
21. **Gallant, Gilles**					
Popelogan	475244	44	21 O/15E	Oct. 21, 2001	Prospecting; collection of rock samples.
28. **Higgins, Allan**					
Carlisle	475254	8	21 J/06W	Oct. 29, 2001	Grid establishment.
30. **Hunter Brook Holdings Ltd.**					
Key Anacon Mines	475261	83	21 P/05E	Nov. 18, 2001	Reclamation; collection and analysis of soil and water samples.
32. **Jamieson, Peter**					
a. Blue Mountain	475216	4	21 O/16W	June 6, 2001	Prospecting; collection and analysis of lithogeochemical samples.
b. Blue Mountain B	475219	4	21 O/16W	July 26, 2001	Prospecting; collection and analysis of soil and rock samples; compilation.
37. **Lockhart, A. Wayne**					
Royal Vault Project	475294	600	21 O/11E, 21 O/14E	Feb. 7, 2002	Prospecting; geological mapping; ground geophysical surveys (magnetometer, VLF EM-16); plotting and interpretation of airborne geophysical data; collection and analysis of geochemical samples (silts, rocks, heavy mineral pan concentrates).
38. **Log House Construction Ltd.**					
a. Arleau Brook	475292	33	21 O/09E	Jan. 28, 2002	Grid establishment; VLF and magnetic surveys; collection and analysis of soil and rock samples.

Reports of Work

1. Atcan Capital Corp.
2. Bathurst Exploration Ltd.
3. Bathurst Silver Mines Ltd.
4. Bernier, Norene
5. Black Bull Resources (B.C.) Ltd.
6. Black, Don
7. Black, Joey
8. Brooks, Earnest A.
9. Canoga Resources Ltd.
10. CanZinco Ltd.
11. Carroll, Wayne
12. Cobrun Mining Corporation
13. Cox, Reg W.
14. Donovan, Robert
15. Duncan, John
16. Eastmain Resources Inc.
17. Fahey, Joseph
18. Fancamp Resources Ltd.
19. Fenety, Peter
20. Freewest Resources Canada Inc.
21. Gallant, Gilles
22. Goldcorp Inc.
23. Golden Bay Resources Inc.
24. Golden Hope Mines Ltd.
25. Graham, Don
26. Graham, Ian
27. Hattie, Don W.
28. Higgins, Allan
29. Hudgins, Avard D.
30. Hunter Brook Holdings Ltd.
31. J.D. Irving Limited
32. Jamieson, Peter
33. Johnston, Anthony
34. Kelmet Resources Ltd.
35. Kingsway Materials Ltd.
36. Lafarge Canada Inc.
37. Lockhart, A. Wayne
38. Log House Construction Ltd.
39. Major General Resources Ltd.
40. Marr, Pat
41. Miramichi Minerals Ltd.
42. Noel, Lorenzo
43. Noranda Inc.
44. Noranda Mining and Exploration Inc.
45. Northeast Exploration Services Limited
46. PGE Resource Corp.
47. Ross, Frank
48. Ross, Frank and Donovan, Robert
49. Scintilore Explorations Ltd.
50. Scott, Mitchell
51. Slam Exploration Ltd.
52. Smith, Mike
53. Stewart, Kyle
54. Stratabound Minerals Corp.
55. Teck Corporation / Teck Exploration Ltd.
56. Teck Exploration Ltd.
57. Ward, Don
58. Watters, Sheila
59. White, Arnold



Simplified Zones of New Brunswick:

1. Edmundston
2. Kedgwick
3. Tobique–Chaleur
4. Elmtree
5. Miramichi
6. Fredericton
7. Passamaquoddy
8. Saint John
9. Maritimes Basin
10. Fundy Basin

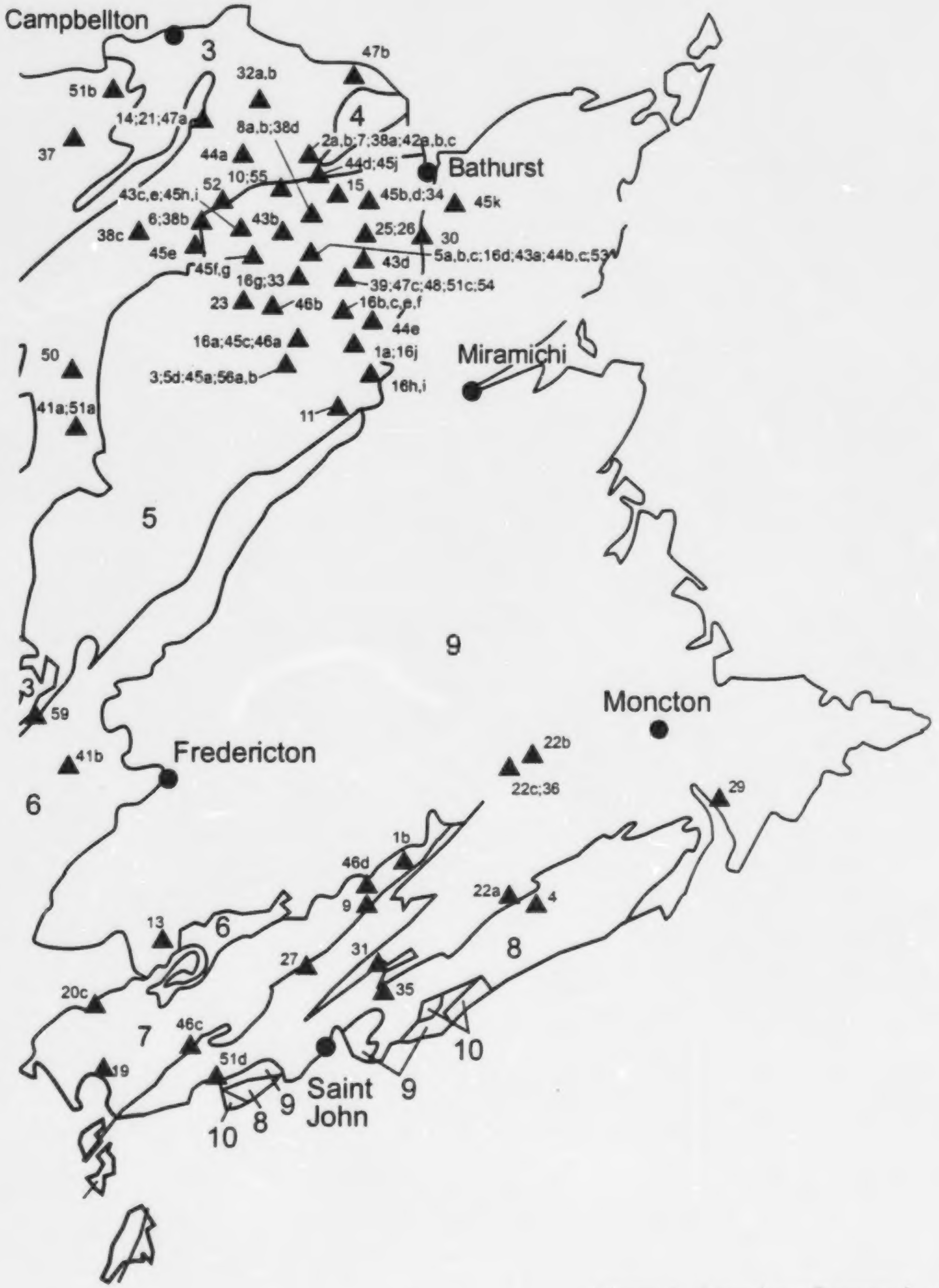

Campbellton
3
47b
32a,b
51b
14;21;47a
4
37
8a,b;38d
2a,b;7;38a;42a,b,c
44a
44d;45j
Bathurst
52
10;55
15
45b,d;34
45k
43c,e;45h,i
6;38b
43b
38c
25;26
30
45e
5a,b,c;16d;43a;44b,c;53
43d
45f,g
16g;33
39;47c;48;51c;54
23
46b
16b,c,e,f
44e
16a;45c;46a
50
1a;16j
Miramichi
3;5d;45a;56a,b
16h,i
41a;51a
11
5
9
3
59
Moncton
22b
41b
Fredericton
22c;36
6
29
1b
46d
22a
4
9
13
6
8
27
31
35
20c
46c
7
10
19
51d
Saint
John
9
9
8
10

Figure 7. Location of properties for which mineral exploration reports of work were filed in 1999.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
b. Malachite	475275	43	21 O/10E	Dec. 3, 2001	Grid establishment; prospecting; trenching; VLF survey; collection and analysis of lithogeochemical samples; petrographic analysis.
c. Moose Brook	475251	4	21 O/07E	Oct. 22, 2001	Prospecting; trenching.
41. Miramichi Minerals Ltd.					
a. Falls Brook	475228	33	21 J/14E	Aug. 27, 2001	Trenching.
42. Noel, Lorenzo					
a. Clarinda	475247	10	21 O/09E	Oct. 19, 2001	Magnetic and VLF surveys; collection and analysis of soil samples.
b. Noel	475203	6	21 O/09E	May 18, 2001	Prospecting; electromagnetic and magnetic surveys; collection of rock samples.
c. Noel Grid	475222	43	21 O/09E	Aug. 17, 2001	Grid establishment; prospecting; trenching; collection and analysis of soil and lithogeochemical samples; VLF and magnetic surveys.
47. Ross, Frank					
a. Hornet	475215	8	21 O/15E	July 12, 2001	Prospecting; magnetic and VLF surveys; collection and analysis of soil samples.
b. Silver Fox	475232	2	21 P/13W	Sept. 2, 2001	Grid establishment; prospecting; and VLF survey.
50. Scott, Mitchell					
Blue Mountain Lake	475194	13	21 O/03E	Mar. 11, 2001	Grid establishment; prospecting; geological mapping; magnetic survey.
51. Slam Exploration Ltd.					
a. Lewis Brook	475227	38	21 J/14E	Aug. 27, 2001	Trenching; diamond drilling; core assaying.
b. Harris Gulch	475225	6	21 O/15W	Aug. 25, 2001	Grid establishment; geological mapping; VLF-EM survey; collection of soil and lithogeochemical samples.
52. Smith, Mike					
Murray	475204	21	21 O/10E	June 4, 2001	Grid establishment; prospecting; VLF-EM and magnetic surveys; collection and analysis of lithogeochemical samples.
MIRAMICHI TERRANE					
1. Atcan Capital Corp.					
a. Stoney Brook	475273	34	21 P/04W	Dec. 3, 2001	Grid establishment; VLF and magnetic surveys; collection and analysis of soil and rock samples.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
3. **Bathurst Silver Mines Ltd.**					
Chester	475199	2	21 O/01E	May 20, 2001	Grid establishment; Max-Min-I, VLF, magnetic and gravity surveys.
5. **Black Bull Resources (B.C.) Ltd.**					
a. California Lake	475246	13	21 O/08E	Oct. 8, 2001	Compilation.
b. California Lake	475248	7	21 O/08E	Oct. 8, 2001	Grid establishment; gravity survey; and compilation
c. California Lake	475249	4	21 O/08E	Oct. 8, 2001	Grid establishment; gravity survey; and compilation.
d. Chester Northeast	475201	17	21 O/01E	May 20, 2001	Collection and analysis of stream sediment samples.
e. Monument	475283	20	21 G/13W	Dec. 28, 2001	Geological mapping; prospecting; Landsat study.
8. **Brooks, Earnest A.**					
a. Au Sb	475263	7	21 O/08E	Nov. 15, 2001	Prospecting; trenching; geological mapping; collection of lithogeochemical samples.
b. Silver	475289	12	21 O/08E	Jan. 14, 2002	Geologic mapping; compilation; collection of lithogeochemical samples.
10. **CanZinco Ltd.**					
Caribou North	475209	12	21 O/09E	June 23, 2001	IP survey.
11. **Carroll, Wayne**					
Little Sevogle NE	475286	24	21 J/16W, 21 I/13	Dec. 28, 2001	IP survey; collection and analysis of rock and soil geochemical samples; diamond drilling.
15. **Duncan, John**					
Smith Showing	475265	4	21 O/09E	Oct. 29, 2001	Trenching.
16. **Eastmain Resources Inc.**					
a. Holmes Meadow	475226	20	21 O/01E	Aug. 25, 2001	Trenching; collection and analysis of lithogeochemical samples.
b. Island Lake	475192	17	21 O/08E	Apr. 8, 2001	Prospecting; geologic mapping; collection and analysis of lithogeochemical samples.
c. Little River/Roche Long Lac/Sandburn	475259	76	21 P/04W	Nov. 1, 2001	Grid establishment; geological mapping; HLEM and magnetic surveys; compilation; and collection and analysis of lithogeochemical samples.
d. Otter Brook	475197	33	21 O/08E	May 7, 2001	Diamond drilling; core logging; collection and analysis of lithogeochemical samples.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
e. Railroad Project	475198	419	21 O/08E, 21P/4W,5E	May 11, 2001	Grid establishment; trenching; geologic mapping; induced polarization and magnetic surveys; compilation; collection and analysis of lithogeochemical samples.
f. Railroad Project	475295	379	21 O/1,08 21 P/04,05	Feb. 7, 2002	Grid establishment; geological mapping; magnetic survey; collection and analysis of lithogeochemical samples.
g. Rocky Lake	475207	165	21 O/08E	June 23, 2001	Grid establishment; collection and analysis of lithogeochemical samples, diamond drilling; IP, Mag. and Max-Min-I surveys
h. Tingley Brook	475278	118	21 P/04W	Dec. 14, 2001	Grid establishment; magnetic and Max-Min I surveys; diamond drilling; collection and analysis of lithogeochemical samples.
i. Tingley Brook North	475280	32	21 P/04W	Dec. 14, 2001	Grid establishment; magnetic and Max-Min I surveys; compilation.
j. Tingley Brook West	475279	9	21 P/04 W	Dec. 14, 2001	Grid establishment; magnetic and Max-Min I surveys.
18. Fancamp Resources Ltd.					
Browns Mtn.	475255	70	21 G/13E	Nov. 3, 2001	Compilation; relogging core; prospecting; soil, till, silt and rock sampling with chmical analysis; trenching; induced polarization survey; petrographic examinations.
20. Freewest Resources Canada Inc.					
a. McDougall Road	475212	73	21 G/13E	June 28, 2001	Grid establishment; prospecting; collection and analysis of soil samples.
b. Golden Ridge	475211	390	21 G/13W	June 25, 2001	Geological mapping; prospecting; trenching; overburden drilling; soil sampling; geochemical analysis of samples collected.
23. Golden Bay Resources Inc.					
Maliseet Mtn.	475290	2	21 O/08W	Jan. 18, 2002	Grid establishment; prospecting; geological mapping; VLF survey.
24. Golden Hope Mines Ltd.					
Browns Mtn.	475277	18	21 G/13E	Dec. 2, 2001	Grid establishment; prospecting; collection and analysis of grab samples; collection and analysis of soil and silt samples.
25. Graham, Don					
Headway North & West	475270	12	21 P/05W	Nov. 26, 2001	Grid establishment; induced polarization–resistivity survey.
26. Grahan, Ian					
Headway	475271	15	21 P/05W	Nov. 25, 2001	Grid establishment; induced polarization–resistivity and gravity surveys.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
33. Johnston, Anthony					
Stratmat	475262	6	21 O/08E	Nov. 17, 2001	Prospecting; collection and analysis of soil and rock geochemical samples.
34. Kelmet Resources Ltd.					
Brunswick Extension	475245	82	21 P/12W	Oct. 5, 2001	Diamond drilling; collection and analysis of lithogeochemical samples
38. Log House Construction Ltd.					
d. South Branch Middle River	475250	11	21 O/09E	Oct. 22, 2001	Prospecting; trenching; collection and analysis of lithogeochemical samples.
39. Major General Resources Ltd.					
Nepisiguit Brook Property	475205	176	21 P/05W	June 9, 2001	Diamond drilling; collection and analysis of lithogeochemical samples.
40. Marr, Pat					
Springfield	475269	52	21 G/13E	Nov. 15, 2001	Relogging diamond-drill core; magnetic and VLF-EM surveys; prospecting; collection and analysis of grab samples.
41. Miramichi Minerals Ltd.					
b. Springfield	475260	9	21 J/03E	Nov. 19, 2001	Prospecting; geological mapping; collection and analysis of grab samples.
43. Noranda Inc.					
a. Central Camp	475281	36	21 O/08E	Dec. 22, 2001	Diamond drilling.
b. Camel Back East/Indian Lake	475266	261	21 O/08,	Nov. 30, 2001	Grid establishment; trenching; geological mapping; diamond drilling; collection and analysis of soil geochemical samples; magnetic, gravity, HLEM and VLF-EM surveys.
c. Portage Brook North	475241	86	21 O/08W	Sept. 21, 2001	Diamond drilling; collection and analysis of drill-core geochemical samples.
d. Sabina	475253	179	21 P/05W	Oct. 28, 2001	Prospecting; seismic survey; diamond drilling.
e. Gold	475223	23	21 O/08W	Aug. 4, 2001	Grid establishment; trenching; collection and analysis of soil and lithogeochemical samples; HLEM, magnetic, and VLF surveys.
44. Noranda Mining and Exploration Inc.					
a. Devils Elbow	475210	68	21 O/08W	June 25, 2001	Grid establishment; trenching; collection and analysis of soil and lithogeochemical samples; magnetic, VLF, gravity and TEM surveys.
b. Fly Tent Brook	475224	307	21 O/08W	Aug. 20, 2001	Grid establishment; trenching; diamond drilling; collection and analysis of soil samples; VLF, magnetic, HLEM, gravity, surface and down-hole TEM surveys.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
c. Mt. Fronsac	475214	31	21 O/08W	July 13, 2001	Grid establishment; magnetic, VLF, HLEM, and gravity surveys; down-hole TEM surveys; collection and analysis of soil geochemical samples; diamond drilling.
d. Orvan Brook	475267	32	21 O/09E	Nov. 30, 2001	Grid establishment; geologic mapping; HLEM and magnetic surveys; diamond drilling; collection and analysis of drill core and rock geochemical samples.
e. Tomogonops River	475258	29	21 P/04W	Nov. 9, 2001	Diamond drilling.
45. Northeast Exploration Services Limited					
a. Chester	475200	2	21 O/01E	May 20, 2001	Grid establishment; magnetic, VLF and gravity surveys.
b. Gap	475190	11	21 P/12W	Apr. 7, 2001	Grid establishment; VLF-EM and magnetic surveys; collection and analysis of soil samples.
c. GIS South	475285	39	21 O/01E	Dec. 28, 2001	Diamond drilling; induced polarization data interpretation.
d. Middle River	475191	30	21 P/12W	Apr. 7, 2001	Grid establishment; prospecting; VLF-EM and magnetic surveys; collection and analysis of soil samples; diamond drilling.
e. Mount Baird East	475238	9	21 O/07E	Sept. 15, 2001	Compilation.
f. Mount Baird North	475234	35	21 O/07E	Sept. 15, 2001	Grid establishment; VLF, magnetic, and Max-Min I surveys; collection and analysis of soil samples.
g. Mount Bird South	475236	6	21 O/07E	Sept. 15, 2001	Grid establishment; prospecting; VLF and magnetic surveys.
h. Tower	475189	22	21 O/08W	Apr. 7, 2001	Grid establishment; VLF-EM, magnetic, and gravity surveys; collection and analysis of soil samples; core logging.
i. West Branch Portage	475235	10	21 O/07E	Sept. 15, 2001	Grid establishment; prospecting; VLF survey.
j. Wildcat	475208	36	21 O/09E	June 23, 2001	Induced polarization survey.
46. PGE Resource Corp.					
a. Bills Lake	475274	98	21 O/01E	Dec. 3, 2001	Diamond drilling.
b. Nowlan Lake	475196	42	21 O/08W	Apr. 20, 2001	VLF-EM and magnetic surveys; collection and analysis of soil geochemical samples.
47. Ross, Frank					
c. Ross/Lanteigne	475229	1	21 O/08E	Sept. 2, 2001	Grid refurbishment; prospecting.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
48. Ross, Frank and Donovan, Robert					
Lazares Brook	475291	12	21 O/08E	Jan. 18, 2002	Grid establishment; prospecting; HLEM and gravity surveys; collection and analysis of soil and rock geochemical samples.
49. Scintilore Explorations Ltd.					
Browns Mtn.	475276	15	21 G/13E	Dec. 2, 2001	Grid establishment; prospecting; collection and analysis of grab samples; collection and analysis of soil, till, and stream silt samples.
51. Slam Exploration Ltd.					
c. Coles Brook	475184	15	21 O/08E	Feb. 22, 2001	Prospecting; geologic mapping; collection of rock samples.
53. Stewart, Kyle					
Rush Project	475242	6	21O/08E	Oct. 8, 2001	Grid establishment; gravity survey; and compilation.
54. Stratabound Minerals Corp.					
Tomogonops	475187	23	21 P/05W	Mar. 26, 2001	Grid establishment; magnetic and VLF-EM surveys; and geological mapping.
55. Teck Corporation/Teck Exploration					
Bathurst North Project	475186	318	21 O/09E	Feb. 3, 2001	Grid establishment; gravity; and bore-hole Pulse-EM surveys; geological mapping; and diamond drilling.
56. Teck Exploration Ltd.					
a. Chester	475202	164	21 O/01E	May 20, 2001	Grid establishment; magnetic, Max-Min, VLF, and gravity surveys; geologic mapping; and compilation.
b. Chester	475284	164	21 O/01E	Dec. 28, 2001	Grid refurbishment; prospecting; induced polarization, and gravity surveys; down-hole pulse-EM survey; diamond drilling.
57. Ward, Don					
Poplar Mtn.	475287	14	21 G/13W	Jan. 10, 2002	Diamond drilling and analysis of drill core.
58. Watters, Sheila					
Deadwater Brook	475293	16	21 G/13W	Jan. 26, 2002	Grid establishment; prospecting and till sampling.
59. White, Arnold					
Taffy Lake	475264	70	21 J/03E	Nov. 18, 2001	Grid work; geological mapping; collection and analysis if till samples; magnetic survey.
SAINT JOHN ZONE					
4. Bernier, Norene					
Walton Lake	475243	10	21 H/11E	Oct. 25, 2001	Prospecting; diamond drilling and analysis of core.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
31. **J.D. Irving Limited** Bonney Road	475218	12	21 H/05W	July 22, 2001	Air track drilling.
35. **Kingsway Materials Ltd.** French Village	475188	5	21 H/05W	Mar.16, 2001	Grid establishment; geological mapping; collection and physical and chemical analysis of grab samples; petrographic examination.
51. **Slam Exploration Ltd.** d. Harvey Brook	475268	6	21 G/02E	Nov. 25, 2001	Prospecting; geologic mapping; collection and analysis of grab samples.
FREDERICTON ZONE					
12. **Cobrun Mining Corporation** St. Stephen Nickel	475239	37	21 G/03W	Sept. 23, 2001	Induced polarization/resistivity survey; diamond drilling and analysis of drill core.
PASSAMAQUODDY ZONE					
1. **Atcan Capital Corp.** b. East Scotch Settlement	475296	22	21 H/13W	Feb. 14, 2002	Grid establishment; prospecting; collection and analysis of grab samples; collection and analysis of soils; VLF-EM and magnetometer surveys.
9. **Canoga Resources Ltd.** Sleeping Beauty	475282	22	21 H/12W	Dec. 21, 2001	Grid establishment; VLF-EM and magnetometer surveys; collection and analysis of soil samples; prospecting; collection and analysis of grab samples.
19. **Fenety, Peter** Digdeguash	475230	5	21 G/02W	Aug. 30, 2001	Collection of soil samples and analysis.
20. **Freewest Resources Canada Inc.** c. Clarence Stream	475257	29	21 G/07W	Nov. 12, 2001	Grid establishment; prospecting; collection and analysis of grab samples.
27. **Hattie, Don W.** McKeel Lake	475288	4	21 G/08E	Jan. 11, 2002	Grid establishment; VLF-EM survey; petrography; electron microscope analyses.
46. **PGE Resource Corp.** c. New River	475193	96	21 G/02E	Mar. 31, 2001	Grid establishment; induced polarization survey; basal till sampling and analysis; collection of humus samples and analysis; diamond drilling and core analysis.

Claim Group	Geoscan No.	No. of Claims	NTS	Release Date	Description of Work
d. Albright Brook	475252	68	21 H/12W	Oct. 28, 2001	Compilation; prospecting and collection of grab samples, collection of soil and stream-sediment samples; chemical analysis of all samples; magnetic and VLF-EM surveys.
MARITIMES BASIN					
13. Cox, Reg W.					
McDougall Brook	475195	5	21 G/10E	Apr. 13, 2001	Trenching; collection and analysis of grab samples.
22. Goldcorp Inc.					
a. Glebe	475185	5	21 H/11W	Feb. 19, 2001	Trail cutting, Air Track drilling, analysis of drill-core chips.
b. Hicksville	475206	23	21 I/03W	Jan. 15, 2001	Geological mapping; trenching; Air Track drilling and chemical analysis of chip samples.
c. Hicksville	475240	27	21 I/03W	Sept. 27, 2001	Site preparation for bulk sampling; bulk sampling; analysis and testing of bulk sample; reclamation.
29. Hudgins, Avard D.					
Taylor Village	475256	31	21 H/15E	Nov. 2, 2001	Prospecting; collection and extensive testing of grab samples including chemical analysis, grinding studies and petrography.
36. Lafarge Canada Inc.					
Springhill	475217	18	21 I/03W	July 15, 2001	Diamond drilling and analysis of drill core.
45. Northeast Exploration Services Limited					
k. Route 8	475237	35	21 P/12E	Sept. 15, 2001	Grid establishment; gravity, magnetic and VLF surveys.

INDUSTRIAL MINERALS

With the exception of those activities associated with location and evaluation of suitable aggregate material(s), exploration directed at New Brunswick's industrial rock and mineral resources in 1999 focused on magnesium, high-calcium limestone, diatomaceous earth, silica, and titanium.

Magnesium (Potash and Salt)

Preliminary investigation of the magnesium content of selected evaporite drill core samples from the Millstream potash prospect (Figure 6: 37) was undertaken by Geological Surveys Branch staff late in 1999. The Millstream property, 5–10 km west of Sussex in southeastern New Brunswick is probably best known for its potash resource that was confirmed by a BP Resources Canada Ltd. drilling program in the early 1980s. Mineral rights to the deposit reverted back to the Province in the early 1990s. IMC Kalium subsequently re-evaluated the deposit in 1996 but opted not to proceed with further evaluation of the property. The mineral rights to the property were once again returned to the Province in 1997.

The Millstream deposit presently remains undeveloped despite the existence of several potash horizons, ranging in thickness from 6.1 to 38.0 m at depths between 950 and 1050 m below surface. Total *in situ* geological reserves have been estimated at 256 000 000 t grading 20.6% K_2O.

Although interest in Millstream has tended to focus on its potash mineralization, potentially large magnesium and rock salt resources are associated with it, in the form of carnallitite, an admixture of the minerals carnallite ($KClMgCl_2 \cdot 6H_2O$) and halite (NaCl). A very preliminary estimate indicates a carnallitite resource of more than 100 000 000 t; however, only about half the prospect has been explored and there remains a very good possibility that additional potash/magnesium resources may be present in unexplored portions of the property. There are no estimates offered quantifying the salt resource. Pending more detailed examination, it would seem that the development of the Millstream property could depend on multi-product recovery (potash, magnesium and rock salt) and on establishing a suitable method of recovery. Considering alternative methods of extraction like solution mining, in light of various advancements in technology, the regional availability of natural gas and the deposit's strategic location near an established port facility and world markets, the Millstream deposit may deserve re-assessment.

Limestone

Limestone deposits of the Carboniferous (Lower Viséan) Windsor Group in southeastern New Brunswick continued to be the target of exploration in 1999. Havelock Lime, a division of Goldcorp Inc., continues to evaluate an interesting property a few kilometres north of its Havelock processing facility (Figure 6: 38) focusing on its suitability for the manufacture of a new high-value specialty lime product. In 1998, the company acquired a 20 000 t bulk sample from a small test quarry on the property and subsequently undertook a 2800 m diamond-drilling program in the fall of 1999 to verify long-term reserves. If successful, calcined lime production at the Havelock lime plant could increase by several tens of thousand tonnes annually and result in a capital investment of $3 000 000 to $4 000 000.

Other noted limestone-based activities were conducted in south-central New Brunswick, about 30 km northeast of Saint John, where J.D. Irving Ltd. undertook an air-track drilling program on a portion of its 192 ha Bonney Road limestone property near Nauwigewauk (Figure 6: 39). In an adjacent 90 ha area, Kingsway Materials Ltd. reported work consisting of mapping, sampling and related testing of a high-calcium limestone resource (Figure 6: 40).

Diatomaceous Earth and Silica

Some exploration activity was reported from southwestern New Brunswick in 1999. A number of mineral claims were established northwest of St. George (Figure 6: 41) where McMinn Pit Ltd. is investigating fine-grained silica and diatomaceous earth found on the floor of a few eutrophic lakes and adjacent bogs.

Titanium

A few years ago claims were staked in southeastern New Brunswick to investigate the paleoplacer and placer potential for titanium in Carboniferous rocks and the Petitcodiac River estuary (Figure 6: 42, 43). Recently, Uranco Minerals Inc. conducted sampling and analytical work, concentrating on the former locality. Results were disappointing, in that titanium in both environments was low grade and found only in ilmenite.

Peat

Eighteen new applications for peat exploration licences on Crown lands were received in 1999: Peatlands 10, 305 and a grouping of small peatlands in the Killarney Road area near Fredericton, by Envirem Technologies Inc.; Peatland 575 by Jeanne-Mance Larocque; Peatland 324N by Premier Horticulture ltée; Peatlands 675, 678, 680, 684 and 684A by McMinn Pit Ltd.; Peatlands 305, 324N, 337A, 339 and 356 by Le Groupe Berger ltée; Peatlands 544, 547 and 553 by Sun Gro Horticulture Canada Ltd. Fourteen applications for Options were received: Peatlands 60, 61, 343, 494, 544, 547, 551, 553 and 554 by La Mousse Acadienne (1979) ltée; Peatland 304A by Le Groupe Berger ltée; Peatlands 373, 376 and 383 by Le Groupe Qualité Lamèque ltée; and Peatland 305 by Malpec Peat Moss Ltd.

Three Peat Exploration Licences were issued: Licence 99-1 to Le Groupe Qualité Lamèque ltée for Peatland 25; Licence 99-2 to Compagnie de Tourbe Fafard ltée for Peatland 552; and Licence 99-3 to Premier Horticulture ltée for Peatland 324N. Nine options were issued : Le Groupe Qualité Lamèque ltée for Peatland 577; Premier Horticulture ltée for Peatlands 27, 29, 52, 115, 153 and 324N; Le Groupe Berger ltée for Peatlands 324N and 356.

Five Peat Exploration Licence applications were rejected: a group of small peatlands in the Burgess Settlement area near Grand-Sault, by Guy Côté; a group of small peatlands in the Killarney Road area near Fredericton, by Envirem Technologies Inc.; Peatland 575 by Jeanne-Mance Larocque; and Peatlands 324N and 356 by Le Groupe Berger ltée. McMinn Pit Ltd. abandoned its interest in Peatlands 675, 678, 680 and 684.

Beginning in May, all new applications received were placed on hold pending the finalization of a government review of provincial policies concerning the peat industry.

Le Groupe Qualité Lamèque ltée

COMPANY Le Groupe Qualité Lamèque ltée, 86, rue de la Tourbe, Lamèque, New Brunswick E8T 1A3. Telephone: (506) 344-2293. The President is Florent Chiasson.

RIGHTS Peat Exploration Licence 99-1 (1274 ha) on Peatland 25, under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 25 is located 20 km northwest of Harcourt, Kent County (Figure 6: 44).

History Le Groupe Qualité Lamèque ltée first applied for an exploration licence in 1987. An option agreement was concluded in 1991. In 1998, the company applied for an exploration licence. Peat Exploration Licence 99-1 was issued in February 1999.

Reserves and Grade 16.06 Mm^3 surficial peat; average depth 2.1 m; average humification of the horticultural grade peat 2.9 von Post.

Compagnie de Tourbe Fafard ltée

Company Compagnie de Tourbe Fafard ltée, 422, chemin Pallot, Inkerman, New Brunswick E8P 1B5. Telephone: (506) 336-9715. The Manager is Denis Mallet.

Rights Peat Exploration Licence 99-2 (410 ha) on Peatland 552, under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatland 552 is located 6 km southwest of Black Rock, Gloucester County (Figure 6: 45).

History Compagnie de Tourbe Fafard ltée had been issued a licence in 1988. A new licence was issued in 1991. In 1994, an option agreement was concluded. In 1997, the company applied again for an exploration licence. Peat Exploration Licence 99-2 was issued in April of 1999.

Reserves and Grade 9.78 Mm^3 surficial peat; average depth 2.8 m; average humification 3.2 von Post.

Premier Horticulture ltée

Company Premier Horticulture ltée, 1, avenue Premier, C.P. 2600, Rivière-du-Loup (Québec). Telephone: (418) 862-6356. The Manager is Michel Vachon.

Rights Peat Exploration Licence 99-3 (245 ha) on Peatland 324N, under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatland 324N is located 3 km south of Escuminac, Northumberland County (Figure 6:46).

History Premier Horticulture ltée had been issued an option in 1999. It applied for and received a licence in July of the same year.

Reserves and Grade An estimated 7.55 Mm^3 surficial peat; average depth 3.1 m; average humification 3.3 von Post.

La Mousse Acadienne (1979) ltée

Company La Mousse Acadienne (1979) ltée, C.P. 2002, Lamèque, New Brunswick E8T 3N3. Telephone: (506) 344-2225. The Manager is Gilles Haché.

Rights Peat Exploration Licence 98-2 (26 ha) on Peatland 574, under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 574 is located in Cap-Bateau, Gloucester County (Figure 6: 47).

HISTORY La Mousse Acadienne (1979) ltée had been issued a licence in 1994 but abandoned its project in 1996. In 1998, the company expressed its renewed interest by applying for an exploration licence. Peat Exploration Licence 98-2 was issued in June of the same year.

RESERVES AND GRADE 2.07 Mm^3 surficial peat; average depth 2.1 m; average humification 3.1 von Post.

Jiffy Products (N.B.) Ltd.

COMPANY Jiffy Products (N.B.) Ltd., C.P. 2004, Parc industriel, Shippagan, N.B. E8S 3H1. The Manager is Alonzo Dupuis. Telephone: (506) 336-2284.

RIGHT Peat Lease No. 32 (268 ha) on Peatland 536 under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 536 is located 8 km north of Tracadie-Sheila, between Pont-Landry and Ste-Rose, Gloucester County (Figure 6: 48).

HISTORY Jiffy Products (N.B.) Ltd., a subsidiary of Jiffy Products International, Oslo, Norway, established a peat pot and pellet manufacturing plant in Shippagan in 1975. In 1982, the company was issued a Peat Exploration Licence for Peatland 536. A Peat Lease was granted in 1989 to guarantee a long-term supply of quality peat moss for the manufacturing plant.

RESERVES AND GRADE 5.64 Mm^3 surficial peat; average depth 2.6 m; average humification 3.4 von Post.

DEVELOPMENT No new development. Peatland 536 is considered a reserve for future needs.

HYDROCARBONS AND UNDERGROUND STORAGE

Oil and Natural Gas

Corridor Resources Inc.

COMPANY Corridor Resources Inc., Suite 301, 5475 Spring Garden Road, Halifax, Nova Scotia B3J 3T2.

RIGHTS Oil and Natural Gas On-shore Licence to Search 95-02 (35165.3 ha), 95-03 (15774.0 ha), 95-04 (20072.4 ha), 95-05 (7762.9 ha), 97-02 (11 883 ha). 97-03 (35 930 ha), 97-04 (17 950 ha), 98-09 (18 005 ha), and 98-10 (17 980 ha) under the *Oil and Natural Gas Act*, Chapter O-2.1, R.S.N.B. 1976.

LOCATION Licences 95-02, 95-03, 95-04 and 95-05 are in the Dorchester to Port Elgin area (Figure 6: 49a) of Westmorland County (NTS 21 I/1, 21 H/16). Licences 97-02, 97-03, 97-04, 98-09 and 98-10 are in the Moncton Subbasin between Moncton and Sussex (Figure 6: 49b) in Kings, Westmorland and Albert counties (parts of NTS 21 H/13, 14, 15, 16; 21 I/01, 02).

HISTORY Corridor continued to examine existing public geological and geophysical data in the Sackville and Moncton subbasins. The company acquired 29 km of seismic reflection data in the Fairfield–Woodhurst area on Licence 95-02. Corridor signed a joint venture agreement with Columbia Natural Resources by which Columbia purchased a 50% working interest in Corrdor's licences. In the fall a deep well (2644 m), Corridor/Columbia Will DeMille No.1 was drilled on licence 97-02.

OUTLOOK The company continues to examine prospects in various location on its lands.

Irving Oil Limited

COMPANY Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1.

RIGHTS Oil and Natural Gas On-shore Lease 74-1 (2153.7 ha), under the *Oil and Natural Gas Act*, Chapter O-2.1, R.S.N.B. 1976.

LOCATION Lease 74-1, in the Stoney Creek field (Figure 6: 50) is 16 km south of Moncton in Albert County (NTS 21 H/15).

HISTORY Lease 74-1 is in the sixth year of the third ten-year term. There has been no oil production from the field since 1988 and no natural gas production since 1991.

OUTLOOK An inventory of wells and equipment located in the field during the summer resulted in the decommissioning of tanks and remediation work later in the year. The company intends to submit reports of the inventory and work completed in the field.

Jean Mariadassou

COMPANY Jean Mariadassou, Suite 304, 7100 Bombardier, Anjou, Québec H1H 2G2.

RIGHTS Oil and Natural Gas On-shore Licence to Search 97-01 (10 522 ha) under the *Oil and Natural Gas Act*, Chapter O-2.1, R.S.N.B. 1976.

LOCATION The licence area is in northwestern New Brunswick, just northeast of St. Leonard (Figure 6: 51) in Madawaska County (NTS 21 O/04, 05).

HISTORY The Notre Dame de Lourdes #1 well remains suspended at a depth of 275 m.

OUTLOOK The licensee continues to examine geological data for the area and hopes to deepen the well in future.

MariCo Oil and Gas Corporation

COMPANY MariCo Oil and Gas Corporation, 391 Brunswick St., Fredericton, New Brunswick E3B 1H2.

RIGHTS Oil and Natural Gas On-shore Licence to Search 93-02 (33411.5 ha), 97-05 (35 823 ha), 97-06 (35 823 ha), 97-07 (17 898 ha), 97-08 (35 717 ha), 97-09 (35 717 ha), 98-01 (34 593 ha), 98-02 (35 930 ha), 98-03 (25 155 ha), 98-04 (10 779 ha), 98-05 (10 746.9), 98-06 (19 336 ha), 98-07 (35 717 ha), and 98-08 (15 352.9 ha) under the *Oil and Natural Gas Act*, Chapter O-2.1, R.S.N.B. 1976.

LOCATION Licence area 93-02, located 10–20 km south of Moncton in the Turtle Creek area (Figure 6: 52a) of Albert County (NTS 21 H/15), is immediately west and along strike of the previously productive Stoney Creek oil and gas field. The 97-05 to 97-09 licences are located north and west of Moncton (Figure 6: 52b) in the counties of Albert, Kings, Kent, Queens and Westmorland, while the 98-01 to 98-08 licences are located northeast, east and south of Fredericton (Figure 6: 52c) in Sunbury and York counties.

HISTORY Licence to Search 93-02 was issued in July 1993 to Ardent Resources Inc. and subsequently transferred to MariCo. A farm-in by the company on Seglund's three licences increased its exploration rights to some 411 100 ha. MariCo formed a joint venture arrangement with Columbia Natural Resources by which Columbia acquired 50 per cent working interest in MariCo's New Brunswick licences and a 50 per cent interest in the Downey No. 1 discovery well. A step-out well, MariCo Bull Creek No.1, was drilled 850 m southeast of the discovery well and had to be abandoned short of its target depth when the bit got stuck in the hole.

OUTLOOK The company continued to examine data and develop models for the Marysville Subbasin licences.

J.A. Seglund Inc.

COMPANY J.A. Seglund Inc., 9825 Ana Hula St., Diamond Head, Mississippi, U.S.A. 39525-4400.

RIGHTS Oil and Natural Gas On-shore Licences to Search 93-01 (10057.1 ha), and 95-01 (8990.5 ha) under the *Oil and Natural Gas Act*, Chapter O-2.1, R.S.N.B. 1976.

LOCATION The two licences are about 15 km south of Moncton in the Albert Mines to Saint-Joseph area, on both sides of the Petitcodiac and Memramcook rivers (Figure 6: 53) in Albert and Westmorland counties (NTS 21 H/15).

HISTORY Former Licence to Search 91-01 was converted to four leases at the end of the term. Licence to Search 93-01 was issued on July 12, 1993 and Licence to Search 95-01 on February 14, 1995. A farmout agreement with MariCo Oil and Gas Corporation and the subsequent joint venture with Columbia resulted in the spudding of MariCo Taylor Village OW No. 2 on Seglund's 93-01 licence. (see MariCo, above).

OUTLOOK The company plans to continue with drilling in the area.

RHT Enterprises Ltd.

COMPANY RHT Enterprises Ltd., 69 Biddington Ave., Lakeville, Westmorland County, New Brunswick E1H 1C2.

Rights Oil and Natural Gas On-shore Licences to Search 92-01 (10 735.4 ha) and 92-02 (22 151.2 ha) under the *Oil and Natural Gas Act*, Chapter O-2.1, R.S.N.B. 1976.

Location The licence areas are northeast of Moncton between Lakeville and Cocagne (Figure 6: 54) in Westmorland and Kent counties (NTS 21 I/02, 07).

History The licences were issued in January 1992 to Lakeside Estates Ltd. and in May 1992 were transferred to RHT Enterprises Ltd. of Moncton. The company has drilled one dry hole on its licences. The second hole, RHT Lakeside No. 2, remains suspended.

Outlook The company intends to re-enter RHT Lakeside #2 and complete the well when adequate funding can be secured.

Bituminous Shale

A.A. (NB) Inc.

Company A.A. (NB) Inc., P.O. Box 3133, Station B, Fredericton, New Brunswick E3A 5G9.

Rights Bituminous Shale Development Permit 97-01 (762.5 ha), and 97-02 (314.6 ha), under the *Bituminous Shale Act*, Chapter B-4.1, R.S.N.B. 1976.

Location Development Permit 97-01 is located near Dover (Figure 6: 55a) in Westmorland County. Permits 97-02 is located at Albert Mines (Figure 6: 55b) in Albert County (NTS 21 H/15).

History Development Permit 97-03 near Rosevale was surrendered toward the end of 1998. The company carried out a shallow core hole drilling program at 20 locations on its two permit areas. Core will be examined and samples analyzed.

Shell Canada Limited

Company Shell Canada Limited, 400-4th Avenue S.W., P.O. Box 100, Station M, Calgary, Alberta T2P 2H5.

Rights Bituminous Shale Licence to Search 98-01 (24 610 ha) under the *Bituminous Shale Act*, Chapter B-4.1, R.S.N.B. 1976.

Location Bituminous Shale Licence to Search 98-01 extends from Prosser Brook in Albert County across the Petitcodiac and Memramcook rivers to College Bridge (Figure 6:56) in Westmorland County (NTS 21 H/15).

History In May, Shell drilled the final well, Shell Breau No. 1, thus completing a nine-hole core-drilling program with a total length of 6200 m. The company carried out wireline logging on all the holes and extensively sampled and analyzed organic-rich intervals by Rock-Eval pyrolysis. The company cancelled it licence to search at the end of the first year following a major corporate restructuring.

Underground Storage

St. Clair Pipelines (1996) Ltd.

COMPANY St. Clair Pipelines (1996) Ltd., 50 Keil Drive North, Chatham, Ontario N7M 5M1

RIGHTS Underground Storage Exploration Licences 96-01 (898.5 ha) and 96-02 (1167.7 ha) under the *Underground Storage Act*, Chapter U-1.1 R.S.N.B. 1978.

LOCATION Licence 99-02 is in the Dorchester area (Figure 6: 57) of Westmorland County (NTS 21 H/15).

HISTORY Two three-year nonrenewable licences, 96-01 (Dorchester) and 96-02 (Point de Bute) were granted on February 23, 1996. Both licenced expired February 1999. The company applied for the Dorchester area prior to expiry and a new licence was granted for the 898.5 ha area.

OUTLOOK The single licence of St. Clair Pipelines (1996) Ltd. is in good standing.

Intragaz

COMPANY Intragaz, 6565, boul. Jean XXIII, Trois-Rivières-Ouest, Québec G9A 5C9.

RIGHTS Underground Storage Exploration Licences 97-01 (628.1 ha), 97-05 (7458.7 ha), 98-01 (15 363.1 ha), 98-02 (650.4 ha), 99-01 (2 446.4 ha), and 99-03 (1 347.4 ha) under the *Underground Storage Act*, Chapter U-1.1 R.S.N.B. 1978.

LOCATION Licence 97-01 (Baie Verte), 97-05 (Sackville), 98-01 (Port Elgin–Coppermine), 98-02 (Uniacke Hill), 99-01 (Jolicure), and 99-03 (Point de Bute) are located in Albert and Westmorland counties.

HISTORY Intragaz was granted eight licences to explore for and evaluate underground storage potential for fluids in southern and southeastern New Brunswick. The company has not retained Licences 97-01, and 97-05 of the original eight licences, citing the location as too risky to carry on exploration. The company has added to its holdings Port Elgin–Coppermine, Uniacke Hill, Jolicure and Point de Bute (Figure 6: 58) areas.

OUTLOOK The company continued to assess pre-existing geological and geophysical data available for its licence areas.

Chapter 3. Mines and Quarries

PRODUCTION STATISTICS

The 1999 value of mineral production (including coal) in New Brunswick is estimated to be $857 516 899, representing almost no change from the final value of $862 992 354 in 1998 (Tables 4 and 5, Figure 8). The cessation of production at the Heath Steele base metals mine, which closed at the end of October, was almost offset by a slightly higher average zinc price and a slightly lower Canadian dollar. The Canadian dollar averaged US 67.31¢ for the year, down marginally from 67.51¢ in 1998.

The value of metals production during the year was $597 933 573, which represents 70% of the Province's value of mineral production. Noranda's Brunswick mine achieved higher throughput. CanZinco's Caribou Mine remained shut down after low metal prices and metallurgical difficulties had forced a suspension of operations in August 1998. Zinc continued to dominate the metals sector, with a value of $456 260 342, which represents 76% of the total value of metals. The value of zinc production increased approximately 4% from 1998, despite a fractional decrease in the total amount of zinc produced. The average price of zinc increased by 5% between 1998 (46.5 ¢/lb. [U.S.]) and 1999 (48.8 ¢/lb. [U.S]). The average exchange rate of the Canadian dollar was not a factor in the value of production, as it remained almost unchanged from the year before. Lead contributed $54 839 306 to the value of metal production, down 12% from 1998. Production of lead fell by 8%, while the price fell by 5%. The 1999 average London Metal Exchange price for lead was 22.8 ¢/lb.(U.S.), down from 24.0 ¢/lb.(U.S.) in 1998.

The value of copper production decreased by almost 29%, to $24 788 014. This is attributable to both a drop in the copper price ($0.71/lb. in 1999 vs $0.75/lb. in 1998) and lower production (a decrease

Table 4. Value of Mineral Production* in New Brunswick, 1984 to 1999
(Source: Natural Resources Canada)

Calendar Year	Metals ($)	Nonmetals ($)	Fuels ($)	Structural Materials ($)	Total ($)
1984	497 981 000	47 973 438	29 837 000	42 178 000	617 969 438
1985	364 825 000	62 025 000	31 025 000	43 727 000	502 203 000
1986	312 466 000	118 813 000	28 027 000	42 264 000	501 570 000
1987	391 836 000	152 481 000	33 347 000	44 567 000	622 231 000
1988	604 045 000	226 908 000	33 530 000	46 319 000	910 802 000
1989	582 439 000	210 998 000	33 740 000	45 896 000	864 073 000
1990	584 491 926	208 784 840	37 200 000	47 449 277	877 926 043
1991	375 427 470	220 185 000	34 185 000	41 663 590	671 475 483
1992	594 174 162	243 745 074	32 200 000	38 001 869	908 121 105
1993	489 912 908	208 094 381	33 800 000	40 042 060	771 849 349
1994	543 445 558	252 225 522	28 450 000	37 923 292	862 044 372
1995	670 694 700	281 088 407	24 410 000	44 459 331	1 020 652 438
1996	586 293 968	301 627 615	24 030 000	42 731 027	954 682 610
1997	657 532 566	238 936 898	18 190 000	38 411 671	953 071 135
1998	609 944 183	188 890 558	22 850 000	41 307 613	862 992 354
1999(P)	597 933 573	191 993 876	21 600 000	45 989 450	857 516 899

(P) Preliminary figures; * Current dollars

Table 5. Mineral Production in New Brunswick, 1998 and 1999
(Source: Natural Resources Canada)

Commodity	Unit	1998 Final		1999 Preliminary	
		Quantity	Value ($)	Quantity	Value ($)
Metals					
Antimony	kg	*	*	*	*
Bismuth	kg	175 000	1 951 075	248 600	2 767 415
Cadmium	kg	133 043	124 529	234 717	136 371
Copper	kg	14 152 800	34 745 123	10 561 574	24 788 014
Gold	g	*	*	*	*
Lead	kg	79 327 798	62 192 994	72 924 609	54 839 306
Silver	kg	253 639	66 975 527	220 441	55 732 996
Zinc	kg	288 826 858	439 016 823	285 698 398	456 260 342
TOTAL			609 944 183		597 933 573
Nonmetals					
Marl	t	*	*	*	*
Peat	t	402 448	50 382 490	444 491	57 557 627
Potash	t	*	*	*	*
Quartz (silica)	t	*	*	*	*
Salt	t	*	*	*	*
Sulphur (in smelter gas)	t	102 362	6 789 671	105 453	7 868 903
TOTAL			188 890 558		191 993 876
Fuels					
Coal	t	270 000	22 850 000	260 000	21 600 000
TOTAL			22 850 000		21 600 000
Structural Materials					
Lime	t	*	*	*	*
Sand and Gravel	t	4 336 363	*	4,661,481	*
Stone	t	3 499 995	20 796 027	3 666 568	22 582 327
TOTAL			41 307 613		45 989 450
GRAND TOTAL (CDN)			$ 862 992 354		$ 857 516 899

* confidential information

GRAND TOTAL 1997 (CDN $) $ 953 071 135

of 25%). Antimony, bismuth, and cadmium continued to be produced as by-products from theBrunswick operation. The value and total production of all the by-product metals increased. Gold production dropped substantially (68% of the 1998 total) and the value fell even further, due to a lower average gold price in 1999. Silver production was similarly affected, with a 13% decrease in production compounded by a 6% drop in the average price.

The nonmetals sector of the industry contributed $191 993 876 (22%) to the value of mineral production, a 2% increase over the 1998 value. The largest contributor to the value of nonmetals production

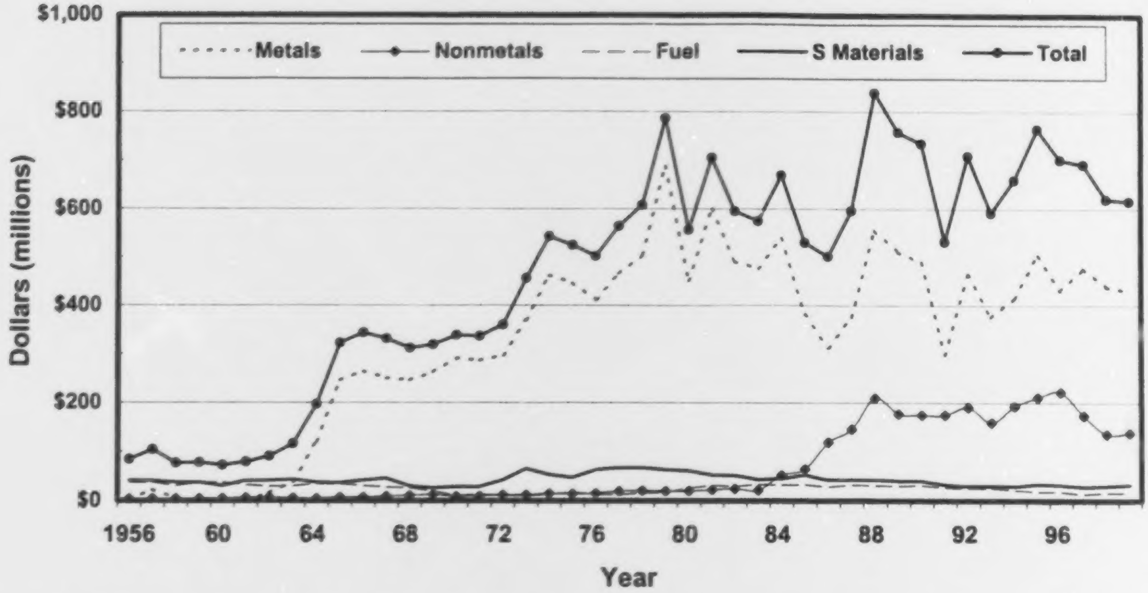


Figure 8. Value of mineral production in New Brunswick, 1956–1999. Abbreviations: S Materials–structural materials. Source: Natural Resources Canada. (1986=100)

is potash. Both the value of potash and amount of production decreased slightly fom 1998 levels. Peat, the second largest contributor ($57 557 627) to the value of nonmetals production, represented 30% of the value of nonmetals. Both the amount and value of peat produced were higher than in 1998. Salt and sulphur in smelter gas ranked next in value of production, while quartz and marl were minor contributors to the nonmetals sector.

The value of coal produced by N.B. Coal Limited in the Minto–Chipman area fell by 5% to $21 600 000. Coal production decreased by 4%.

The value of production for structural materials (lime, stone, sand and gravel) increased 11% to $45 989 450. Sand and gravel production was up 7%, while stone production increased by 5%. These commodities provide the raw material for the construction industry in New Brunswick.

New Brunswick continues to rank first among Canadian provinces and territories in its value of production for zinc, lead, bismuth and peat, and second in silver, antimony and potash (Table 5).

EMPLOYMENT

The mineral industry employed an average of 3539 people in 1999. The following shows employment (permanent and seasonal) by sector in the mineral industry for 1999:

Metals	1773	Peat	1200
Potash	365	Structural Materials	106
Coal	95	Total	3539

Table 6. Rank of the Provinces and Territories in Value of Production for Leading Minerals in Canada, 1999 (P)

Mineral	NF	PE	NS	NB	PQ	ON	MB	SK	AB	BC	YT	NT	Total Value Canada ($000)
Antimony				2						1			986
Bismuth				1						2			2 941
Cadmium				3	2	1				4			704
Clay Products	x		x		x	1		x	x	x			165 713
Coal			4	5				3	2	1			1 484 390
Copper				5	3	2	4	6		1			1 361 344
Gold	8			9	2	1	4	7		3	5	6	2 132 534
Lead				1						3			117 389
Lime				x	x	1	x		x	x			235 621
Marl				x									x
Peat	*	*	x	1	2		x	x					168 767
Potash				x				x					1 775 834
Salt			x	x	x	1		*	*				391 487
Sand & Gravel	*	*	*	x	*	1	x	x	2	3	*	*	861 659
Silver	9			2	5	3	4	10		1	7	8	296 547
Stone	7		4	5	2	1	6		8	3		9	732 369
Sulphur (in smelter gas)				3	2	1				4			63 097
Sulphur (elemental)	x		x			x	x	*	1	x			80 716
Zinc				1	3	6	5	7		4			1 533 278

Source: Statistics Canada Catalogue 26-202

x Confidential information under the *Statistics Act of Canada*

* Unable to calculate ranking

(P) Preliminary estimate

METALLIC MINERALS

Noranda Inc.—Brunswick Mine

COMPANY Noranda Inc.—Brunswick Mine (formerly known as Noranda Mining Inc.—Brunswick Mining Division). Head Office: P.O. Box 755, Ste 4100, BCE Place, 181 Bay St., Toronto, Ontario M5J 2T3. Telephone: (416) 982-7111; Mine Office: P.O. Box 3000, Bathurst, New Brunswick E2A 3Z8; Smelter Office: P.O. Box 2000, Belledune, New Brunswick E0B 1G0. The Chief Operating Officer is David Goldman, the President and Mine Manager is Jean Desrosiers.

RIGHTS In 1962, Brunswick Mining and Smelting Corporation Limited was granted surface and mineral rights to the No. 12 mine property.

LOCATION Brunswick owns Canada's largest zinc deposit and operates one of the world's largest zinc mines. The company also operates a concentrator and lead smelter. The Brunswick No. 12 mine (Figure 9: 1a) is about 24 km west of Bathurst in Gloucester County (Lat. 47° 28.5' N and Long. 65°

53.5' W; NTS 21 P/5W). The concentrator is adjacent to the No. 12 mine; the lead smelter (Figure 9: 1b) is at Belledune Point, about 45 km from the No.12 mine.

HISTORY (Early history is described in Miscellaneous Report 13, "New Brunswick's Mineral Industry, 1993.")

In 1996, the mine experienced heightened seismic activity underground, which resulted in some production areas becoming unavailable for mining. The company subsequently announced a reduction in its production rate from 10 500 t/d to 9 000 t/d. The current production target is 9 300 t/d.

EMPLOYEES In 1999, there were, on average, 965 regular and contract employees at the mine and 597 employees at the smelter.

RESERVES Proven and probable ore reserves: 37 426 000 t grading 0.38% Cu, 8.64% Zn, 3.42% Pb, 102.0 g/t Ag.

PRODUCTION In 1999, 3 390 573 t of ore was milled.

Production	Copper	Lead	Zinc	Silver/Bulk
Grade	0.42%	3.42%	8.72%	118 g/t Ag
Recovery	55.76%	59.35%	84.79%	55.25% Ag
Concentrate	34 102 t	124 729 t	422 671 t	81 025 t bulk

The company produces zinc concentrate destined mainly for Noranda's Canadian Electrolytic Zinc refinery in Valleyfield, Québec and a number of refineries in Europe; lead concentrate for the Belledune smelter; bulk concentrate for Europe; and a copper concentrate mainly for the Noranda smelter in Murdochville, Québec.

Noranda Inc.—Heath Steele Mine

COMPANY Noranda Inc.—Heath Steele Mine (formerly known as Noranda Mining Inc. – Heath Steele Division). The head office address is : P.O. Box 755, Ste 4100, BCE Place, 181 Bay St., Toronto, Ontario M5J 2T3. The mine office address is P.O. Box 400, Miramichi, New Brunswick E1V 3M5. Telephone: (506) 622-2100. The Chief Operating Officer is David Goldman, the President is Jean Desrosiers, and the Mine Manager in 1999 was Denis Lachance. Currently the senior person on site is Noranda's Regional Reclamation Manager, Richard C. Schwenger.

RIGHTS In 1999, the company held Mining Lease 238 (Heath Steele deposit) and Lease 253 (Stratmat boundary deposit) under the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

LOCATION The Heath Steele mine (Figure 9:1c) is 51 km northeast of the city of Miramichi in Northumberland County (Lat. 47° 17' N; Long. 66° 05' W; NTS 21 O/8). The Stratmat boundary deposit (west zone) is approximately 5 km northwest of the Heath Steele mill complex (Lat. 47° 13' N; Long. 66° 07' W; NTS 21 O/8).

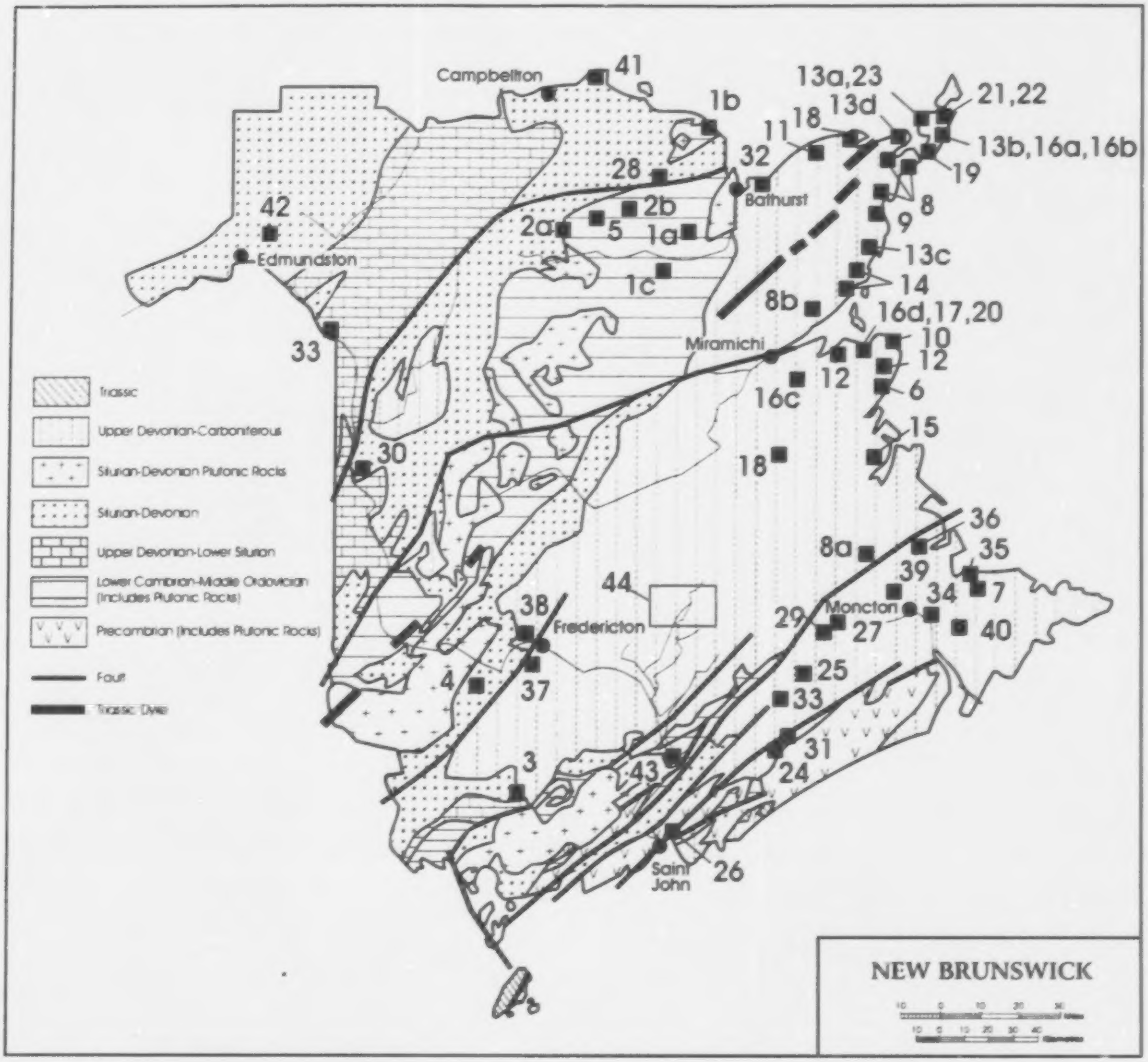

Campbellton
41
1b
13a,23
13d
21,22
18
11
32
13b,16a,16b
19
28
Bathurst
8
42
2b
2a
5
1a
9
13c
Edmundston
1c
14
8b
16d,17,20
33
Miramichi
10
12
12
6
16c
15
30
18
36
35
8a
39
34
7
44
38
Moncton
29
27
40
Fredericton
25
4
37
33
31
3
43
24
Saint John
26
Triassic
Upper Devonian-Carboniferous
Silurian-Devonian Plutonic Rocks
Silurian-Devonian
Upper Devonian-Lower Silurian
Lower Cambrian-Middle Ordovician (Includes Plutonic Rocks)
Precambrian (Includes Plutonic Rocks)
Fault
Triassic Dykes
NEW BRUNSWICK
10 0 10 20 30
10 0 10 20 30 40

Figure 9. Metallic mineral, industrial mineral, and energy producers in New Brunswick in 1999.

1. Noranda Inc.: (a) Brunswick mine (Pb, Zn); (b) Belledune lead smelter; (c) Heath Steele mine (Cu, Pb, Zn, Ag)
2. CanZinco Ltd.–Caribou Mine Division: (a) Restigouche mine (Zn, Pb, Ag, Cu), (b) Caribou mine (Zn, Pb, Cu, Ag, Au)
3. ADEX Mining Inc., Mount Pleasant mine (Sn, In, W, Mo, Zn, Cu, Bi)
4. APOCAN Inc., Lake George mine (Sb)
5. Murray Brook Resources Inc. (a wholly owned subsidiary of NovaGold Resources Inc.), Murray Brook mine (Au, Cu, Pb, Zn)
6. ASB Greenworld Ltd. (peat)
7. Beausejour Peat Moss Inc. (peat)
8. Compagnie de Tourbe Fafard ltée (peat): (a) Kent; (b) Burnt Church
9. Les Entreprises Jean-Eudes Martin et Fils Ltée (peat)
10. Good Earth Canada Ltd. (peat)
11. Grande Anse Peat Moss Co. Ltd. (peat)
12. Le Groupe Berger ltée (peat)

HISTORY (Early history is described in Miscellaneous Report 13, "New Brunswick's Mineral Industry, 1993.")

Production from the C Zone commenced in January 1993 and continued for the first six months. However, in July the company announced that it would be shutting down temporarily (three months) because of low metal prices, in an effort to reduce world metal stocks. Employees participated in a skills upgrading program sponsored jointly by Brunswick Mining and Smelting Corporation Limited and the Provincial and Federal governments. The company did not re-open in September as planned, but in October 1994 when metal prices improved. During the shutdown, the company continued to address environmental concerns associated with the site.

(Figure 9 concluded)

13. Le Groupe Qualité Lamèque ltée (peat): (a) Lamèque; (b) St. Raphaël; (c) Canadian Supreme; (d) Pokesudie
14. Heveco Ltd. (peat)
15. Malpec Peat Moss Ltd. (peat)
16. La Mousse Acadienne (1979) ltée (peat): (a) Acadienne (b) Chiasson; (c) Miramichi; (d) Eel River
17. PaSi Peat Inc. (peat)
18. Premier Horticulture ltée—Division Rogersville (peat): (a) south and (b) west of Rogersville
19. Sun Gro Horticulture Canada Ltd. (peat)
20. Theriault & Hachey Peat Moss Ltd. (peat)
21. La Tourbe de Pigeon Hill ltée (peat)
22. La Tourbière de Petit-Shippagan (peat)
23. La Tourbière du Centre de l'Île ltée (peat)
24. Potash Corporation of Saskatchewan Inc. (Cassidy Lake Division) (processing facility)
25. Potash Corporation of Saskatchewan Inc. (New Brunswick Division) (potash, salt)
26. Brookville Manufacturing Company (limestone, dolomite)
27. Lafarge Canada Inc. (limestone)
28. Elmtree Resources Ltd. (limestone)
29. Havelock Lime, a Division of Goldcorp Inc. (limestone)
30. Upper Kent Lime Works Ltd. (marl)
31. Atlantic Silica Inc. (silica)
32. Chaleur Silica (a Division of The Shaw Group) (silica)
33. Nelson Monuments Ltd. (dimension stone)
34. Maritime Stone Works Inc. (dimension stone)
35. Smith Cut Stone and Quarries Limited (dimension stone)
36. Bastarache Stone Quarrie (dimension stone)
37. Diamond Construction Limited (crushed stone)
38. Gray Stone Quarries, a division of Tri Gil Paving and Construction Ltd.; Warren Maritimes Ltd. (crushed stone)
39. Moncton Crushed Stone, a Division of Modern Construction Ltd.; H.E. Carson Limited (crushed stone)
40. Acadia Crushed Stone Division of Modern Construction Ltd.; MacDonald Paving and Construction Limited (crushed stone)
41. C.M. Stewart Company Limited (crushed stone)
42. Clarence Daigle et Fils Ltée (crushed stone)
43. Lafarge Construction Materials (sand and gravel)
44. N.B. Coal Limited (coal)

Highway 430, between Heath Steele and Brunswick Mines, was upgraded in the fall of 1995 to extend the use of the road during the spring thaw. This minimized the need to haul south to Miramichi and then north to Bathurst each spring.

GEOLOGY Banded massive sulphides occur as boudins and dismembered layers within a high-strain zone in metasedimentary host rocks. Disseminated sulphides occur in the tectonized and illitized metasediments between the boudins. The massive sulphides consist of fine- to medium-grained interbanded sphalerite–galena and pyrite, with local coarse-grained chalcopyrite. Vaguely banded pyrite–chalcopyrite occurs locally. Disseminated sulphides include medium-grained pyrite and/or sphalerite with smaller amounts of galena and chalcopyrite. The sulphide deposits and the metasediments are sandwiched between two polydeformed sequences of felsic crystal and lapilli tuffs ("Northwall and Southwall sequences"). Gabbro and diabase dykes cut the supracrustal rocks. All rocks are thought to be of Middle Ordovician age (Tetagouche Group). The shapes and attitudes of the sulphide-bearing zones are controlled by two dominant sets of folds.

EMPLOYEES In 1999, an average of 215 regular employees and 22 contractors were on site.

RESERVES Ore reserves were depleted during the year, leading to mine closure on October 31, 1999.

PRODUCTION In 1999, 833 816 t of ore were milled at the Heath Steele mine.

Production	Copper	Lead	Zinc	Silver
Grade	0.62%	2.52%	7.46%	94.7 g/t
Recovery	69.88%	49.55%	82.67%	43.58%
Concentrate	10 707 t	24 764 t	92 018 t	

The company produces zinc concentrate destined primarily for Europe, lead concentrate for the Belledune smelter, and a copper concentrate mainly for the Noranda smelter in Murdochville, Québec.

DEVELOPMENTS The company announced final closure of the mine on October 31, 1999, due to the depletion of all mineable ore. In the past few years, Heath Steele management and union, as well as provincial government staff, have been working on a Transition Adjustment Committee to assist employees in managing the termination of their employment. At present the company is working intensively on reclamation and closure issues associated with the site.

CanZinco Ltd.–Caribou Mine Division
(formerly East West Caribou Mining Limited)
Restigouche and Caribou Mines

COMPANY CanZinco Ltd., owned by Breakwater Resources Limited. The head office is 95 Wellington Street West, Suite 2000, Toronto, Ontario, M5J 2N7. The Chairman and CEO is Gordon F. Bub. Telephone: (416) 363-4798. The local address is P.O. Box 26, Bathurst, New Brunswick E2A 3Z1. Telephone: (506) 546-1999. The President and Chief Operating Officer of CanZinco Ltd. is Colin Benner, the General Manager of Caribou Mine is John Martin.

RIGHTS In 1999, CanZinco Ltd., a wholly owned subsidiary of Breakwater Resources Ltd. held a block of 43 claims (*Mining Act*, Chapter M-14.1, S.N.B. 1985) and Mining Lease 255.

LOCATION The Restigouche Zn, Pb, Ag, Cu deposit (Figure 9: 2a) is on the Road to Resources (Highway 180), about 80 km west of Bathurst in Restigouche County. (Lat. 47° 30.2' N; Long. 66° 33.5' W; NTS 21O/7, 10). The Caribou mine (Figure 9: 2b) is also on the Road to Resources, about 50 km from Bathurst (Lat. 47° 33' N; Long. 66° 17.6' W; NTS 21O/9).

HISTORY (Early history is described in Miscellaneous Report 13, "New Brunswick's Mineral Industry, 1993.")

Marshall Minerals Corp. acquired the property rights from Placer Dome Inc. in March 1988. Results of an extensive drilling program to further define reserves and processability of the ore proved favourable and, in February 1989, Marshall registered under the Province's Environmental Impact Assessment (EIA) Regulation. The project was subsequently screened in because the deposit is situated on Charlotte Brook, which flows into Upsalquitch Lake, a well-known sport fishing area in a relatively undisturbed part of the province. The company completed its EIA report and in August 1990 received a positive response from the Lieutenant-Governor-in-Council to its proposal to proceed with project development. A security of $1 600 000 was required to ensure the environmental integrity of the operation.

Marshall proceeded no further than the EIA approval in its acquisition of required government approvals. Although delays associated with the EIA process, the sharp downturn in zinc prices, and the closure of the Caribou operation motivated the company to put the deposit up for sale, the company later renewed its interest in the deposit. In 1993 with federal/provincial funding, Marshall continued metallurgical studies on the ore and initiated environmental and pit design studies.

In 1995, Breakwater Resources Ltd., owner of the nearby Caribou mine, announced a metallurgical breakthrough that would enable the company to consider reopening the Caribou mine. Following a positive feasibility study and testing of Restigouche ore, Breakwater reached an agreement to purchase the Restigouche deposit from Marshall, with the intention of shipping Restigouche ore to the Caribou mill for processing. In 1996, Breakwater Resources, through its subsidiary East West Caribou Mining Ltd., received regulatory approval to mine the Restigouche deposit. Mining of the deposit began in the spring of 1997.

GEOLOGY The deposit occurs within the Middle Ordovician Mount Brittain Formation at the contact between feldspar-crystal poor (footwall) and feldspar-crystal rich (hanging wall) felsic volcanic rocks. The orebody is elongate in form and plunges to the northwest at 15–20°, oblique to the northeast structural trend. It is 490 m long and averages 90 m wide and 30 m thick. The deposit consists of two separate, stratabound, massive sulphide lenses that coalesce in the central part of the orebody. The sulphides comprise, in order of abundance, pyrite, sphalerite, galena, and chalcopyrite and have been traced to a vertical depth of 183 m to the north. Two northwest-trending diabase dykes transect the Restigouche deposit and are parallel to faults that exhibit minor offset.

EMPLOYEES Fourteen people remain on site, two at Restigouche and the remainder at Caribou.

Reserves Marshall Minerals Corp. reported total reserves of 1 730 000 t grading 0.35% Cu, 5.36% Pb, 6.94% Zn, 112.1 g/t Ag, and 1.2 g/t Au. This includes 1 150 000 t of open pit reserves grading 0.38% Cu, 5.96% Pb, 7.71% Zn, 124.1 g/t Ag, and 1.37 g/t Au using a 6% combined lead–zinc cutoff.

Production The two operations have a combined production rate of 3000 t/d (1650 t/d for Caribou and 1350 t/d for Restigouche).

Status Operations remained suspended in 1999, pending improved metal prices, refurbishment of the concentrator and securing of financing.

Developments As part of the 1997 operating plan, the Caribou concentrator was extensively modified and expanded. It was redesigned to produce separate zinc and lead concentrates, rather than a bulk concentrate as was the case when it last operated (in 1990). Surface preparation of the Restigouche open pit began in the fall of 1996. The first ore was produced in the spring of 1997. All ore from the Restigouche site was trucked to the Caribou mine site (Figure 7:2b) for processing. Notable efforts were made to protect the sensitive local environment.

Falling metal prices and metallurgical difficulties encountered in processing the combined Caribou and Restigouche mine ores caused a suspension of operations at both mines in August 1998.

ADEX Mining Inc.
(Mount Pleasant Mine)

Company ADEX Mining Inc. (previously ADEX Mining Corp.) has its head office at 172 King St. E., Suite 810, P.O. Box 13, Toronto, Ontario M5A 1J3. Telephone: (416) 947-1179. Local address: P.O. Box 150, St. George, New Brunswick E0G 2Y0. The Chairman and Chief Executive Officer in 1999 was William B. Burton.

Rights In 1999, ADEX Mining Corporation held 102 claims (4 claims covering the mine area and 98 claims surrounding the mine area) under the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

Location The Mount Pleasant Sn, In, W, Mo, Zn, Cu, Bi property (Figure 9: 3) is about 50 km northeast of St. Stephen, Charlotte County, New Brunswick (NTS 21 G/7W).

History (Early history is described in Miscellaneous Report 13, "New Brunswick's Mineral Industry, 1993.")

In December 1993, Piskahegan Resources Limited purchased the Mount Pleasant mine property from LAC Minerals Ltd. and Billiton Metals Canada Ltd. In 1994, ADEX Mining Corporation agreed to fund exploration and metallurgical work in the amount of $525 000, with the aim of earning the right to acquire a 50.1% interest in Piskahegan Resources Limited. On May 1, 1995, ADEX Mining Corporation acquired 100% of Piskahegan Resources Limited for $9 300 000 in cash and shares. Meanwhile, exploration and metallurgical testing continued while the company attempted to secure financing commitments. In November 1995, the name of the company was changed to ADEX Mining Inc.

In April 1996, ADEX Mining Inc. announced it had secured a financing commitment from the Malaysian Smelting Corp. (MSC), under which MSC would have the right to acquire up to 51% of

ADEX for $28 000 000. The bulk of the investment was conditional on the delivery of a positive feasibility study for the development of the Mount Pleasant mine. Of the total investment, $2 000 000 was earmarked for the preparation of the study. In 1997 ADEX received a consultant's feasibility study. The conclusions were disappointing, as the estimated capital costs were too high to justify a production decision at that time.

RESERVES (Source: ADEX Mining Corporation, Summary Prefeasibility Report, Oct. 1995)

Zone	Description	Category	Tonnage (t)	Grade						
				Sn (%)	Zn (%)	Bi (%)	In (g/t)	Cu (%)	MoS_2 (%)	WO_3 (%)
North	Endo & Contact	Proven	2 774 000	0.9	0.34	0.08	46.88	0.14	0.06	0.13
	Zones (u/g)	Probable	60 000	0.92	0.34	0.08	46.88	0.14	0.06	0.13
	Possible	200 000	1.15	0.34	0.08	46.88	0.14	0.06	0.13	
North	Deep tin (u/g)	Probable	2 140 000	0.6	0.8	0.06	121.19	0.12	0.05	0.08
North	Tin lodes (o/p)	Probable	2 000 000	0.2	0.96	—	125	0.1	—	—
North	W–Mo–Bi (u/g)	Possible	11 500 000	0.11	0.33	0.08	31.25	0.05	0.09	0.24
Saddle	Tin deposit (u/g)	Possible	2 000 000	0.92	0.34	0.08	46.88	0.14	0.06	0.13
Fire Tower	W–Mo–Bi (u/g)	Proven	9 000 000	0	0.08	0.1	31.25	0.05	0.2	0.4
Fire Tower N	Tin deposit (u/g)	Possible	250 000	0.19	2.24	0.13	206.25	0.14	0.2	0.28
Halo	(u/g and o/p)	Possible	15 000 000	—	1.5	—	109.38	—	—	—

Notes: 1 oz./ton equals 31.0025 g/t; u/g (underground); o/p (open pit)

The company's positive prefeasibility study was based on proven and probable reserves of 5 100 000 t grading 0.77% tin, 2.3 oz./ton indium, 0.5% zinc and 0.12% copper.

PRODUCTION None since 1985.

STATUS The operation continues to be suspended. At year's end (1999), the property remained under care and maintenance.

EMPLOYEES During 1999, one company officer was on site.

DEVELOPMENTS The company is continuing attempts to reach agreement with outside investors on a sale of the property.

APOCAN Inc.
(Lake George Mine)

COMPANY APOCAN Inc. The mine address is R.R. 1, Prince William, New Brunswick E0H 1S0. Telephone is (506) 366-2885. The Mine Manager is Wayne Marshall.

RIGHTS In 1999, APOCAN Inc. held Mining Lease 250 under the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

LOCATION The Lake George antimony mine (Figure 9: 4) is approximately 15 km north of Harvey Station and 40 km west-southwest of Fredericton, York County (NTS 21 G/14E).

HISTORY (Early history is described in Miscellaneous Report 19, "New Brunswick's Mineral Industry, 1994.")

In 1987, Landmark Corporation (formerly Durham Resources Inc.) sold the property to Dominion Explorers Inc., one of its subsidiary companies. The low price of antimony concentrate, the unfavourable exchange rate for the Canadian dollar, and low ore reserves forced Dominion Explorers Inc. to reduce annual operating costs as much as 12% in an attempt to remain viable. A work-sharing program was negotiated with the Federal government but was not fully implemented. The operation continued through 1989 but was shut down permanently on January 19, 1990.

Following the closure of the mine, the property was purchased by APOCAN Inc.; Mining Lease 250 was transferred to the company in February, 1990. As a result of sharply higher antimony prices in the second half of 1994, APOCAN decided to resume operations at the Lake George mine. A Certificate of Approval to dewater the underground workings was issued in October, 1994 and in December work began on the installation of a new hoist.

Mine production officially resumed in July 1996. Production targets were reached or exceeded, but problems with the hoist caused a shutdown in December of the same year. The shutdown was prolonged by a sharp drop in the antimony price. Despite hopes that the price would recover sufficiently to allow a resumption of operations, high metal inventories in global markets continue to depress the price.

RESERVES Proven, probable and possible ore reserves: 262 000 t of ore grading 3.45% Sb.

STATUS The operation continues to be suspended.

DEVELOPMENTS At year's end (1999), the mine continued to be under care and maintenance.

Murray Brook Resources Incorporated
(a wholly owned subsidiary of NovaGold Resources Inc.)
(Murray Brook Mine)

COMPANY The Murray Brook gold, copper, zinc, lead deposit is owned and operated by Murray Brook Resources Incorporated, whose parent company is NovaGold Resources Inc. The head office for NovaGold Resources Inc. is: 3 Spectacle Lake Drive, Suite 300, Dartmouth, Nova Scotia, B3B 1W8. Telephone: (902)468-9270. The Chairman and Chief Executive Officer is Gerald J. McConnell; the President and Chief Operating Officer is Rick van Nieuwenhuyse; the Vice-President of Canadian Operations is William L. Young.

RIGHTS In 1999, Murray Brook Resources Incorporated held Mining Lease 252 under the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

LOCATION The Murray Brook deposit (Figure 9: 5) is approximately 80 km west-southwest of Bathurst in Restigouche County (Lat. 47° 31.5' ; Long. 66° 25.8' ; NTS 21 O/9W). It is accessible via Highway 180 and a newly built access road.

HISTORY (Early history is described in Miscellaneous Report 13, "New Brunswick's Mineral Industry, 1993.")

Murray Brook Resources Inc. successfully completed the mining and vat-leach (indoor) processing of the gold-bearing gossan in early 1992. Known for its innovative extraction methods, the company began mining the underlying copper zone in late 1992, with the intention of extracting the metal using a bio-assisted, sulphuric acid, heap-leach (outdoor) method. Due to unforeseen delays, the project missed the seasonal window for this process and startup was delayed. The agreement that NovaGold Resources signed with Arimetco International Inc. and Breakwater Resources Ltd. to further develop the copper zone of the Murray Brook mine expired with neither company exercising its option.

GEOLOGY The Murray Brook deposit occurs within fine-grained sedimentary rocks that conformably underlie feldspar-phyric tuff of the Middle Ordovician Mount Brittain Formation and gradationally overlie quartz wacke and slate of the Miramichi Group. Previously, these sedimentary rocks were assigned to the Patrick Brook Formation, part of the Miramichi Group, but since the discovery of thin interbedded tuff layers, they are now included in the Mount Brittain Formation. The latter is structurally overlain by mafic volcanic rocks of the Boucher Brook Formation.

The deposit, which prior to mining was capped by a thick gossan, dips moderately to the northwest, plunges gently to the northeast, and appears to pinch out in that direction. It is surrounded by a 1–3 m-wide halo of chloritized sedimentary rocks containing disseminated pyrite. The massive sulphides comprise pyrite, sphalerite, chalcopyrite, galena, and arsenopyrite, in decreasing order of abundance and are divisible into copper, pyrite and lead–zinc zones. The copper zone occurs along the footwall and hanging-wall contacts and is generally separated from the lead–zinc zone by a zone of massive pyrite containing minor amounts of the other sulphides.

EMPLOYEES There were no permanent employees at the mine site in 1999.

RESERVES Geological resources of the copper zone are 596 000 t grading 2.81% Cu.

PRODUCTION During the three years the mine operated (1989–1992), 1 413 155 g (45,434 oz.) of gold and 10 776 kg (346,457 oz.) of silver were produced.

STATUS The operation is in the final closure stage.

DEVELOPMENTS Under the impact of a substantially lower copper price, the company decided in 1998 not to proceed with further mining at Murray Brook, despite some initially encouraging results from exploration drilling at the site. During the year, the company completed a UTEM survey and drilled 14 holes on its Murray Brook deposit. The object of the drilling was to test the down-plunge extent of the known Cu zone and to determine if the deposit has a significant Pb–Zn zone prior to reclaiming the open pit. Modelling of the data from previously drilled vertical holes, using a commercially available 3-D software package, showed that the deposit was virtually untested toward the northwest, in the F_2 down-plunge direction. The drilling confirmed that the deposit does continue to the northwest. The best reported Cu intersection was in hole MB-98-3, which contained 13.6 m grading 4.35% Cu, including 7.0 m grading 7.29% Cu. The best reported lead–zinc intersection was in hole MB-98-5A, which contained 20.2 m grading 2.08% Pb, 6.07% Zn and 73.66 g/t Ag. Some reclamation work was done during the year, including the placement of the remaining stockpiled copper ore in the pit.

In 1999, the company received government approval of its updated reclamation plan, and aims to achieve complete reclamation of the site in 2000.

INDUSTRIAL MINERALS

The extraction and processing of industrial minerals resources in New Brunswick is, for the most part, directed to the following ten commodities: peat, potash, salt, limestone, dolomite, marl, silica, dimension stone, crushed stone, and sand and gravel. Several of these are exported to markets throughout the world. The recent closure of one of the Province's two potash mining operations has resulted in a significant decline in the value of potash production and a subsequent drop in the total value of industrial rock and mineral production. Despite the impact of this loss, the preliminary value of industrial mineral production in 1999 (nonmetals and structural materials, Table 5) approached a respectable $250 000 000, a 12 % increase over 1998. The industrial rock and mineral sector accounted for almost 30% of the total value of New Brunswick's mineral production in 1999.

Peat

Eighteen peat companies were active in the Province in 1999. Most of the development is concentrated in northeastern New Brunswick, mainly in the Acadian Peninsula of Gloucester County west of Bathurst, and in the Baie-Ste-Anne region of Northumberland and Kent counties to the east and southeast of Miramichi (Figure 9). About 85% of the 4300 ha currently opened for production are located on Crown lands.

Peat production in 1999 totaled a record 14 500 000 bales, an increase of 35% compared to the preceding year. Shipments reached 11 100 000 bales, a rise of 6% with respect to 1998. In June, inventories stood at 2 405 000 bales; in December that number was 6 129 000 bales. The trend toward using large packaging sizes continued with 49% of the peat moss shipped in sizes larger than the traditional 170 dm^3 bag.

The United States continues to be the principal export market for New Brunswick peat producers. In 1999, about 6 000 000 bales were shipped to the USA and 2 500 000 bales were distributed in Canada. The Japanese market continued to favor peat of Canadian origin and accounted for 18% of New Brunswick's exports.

There are a total of 33 Crown peat leases covering 35 peatlands; 30 peat leases were in production. Four additional operations are located entirely on private land.

ASB Greenworld Ltd.

Company ASB Greenworld Ltd., 200, chemin Daigle, Pointe-Sapin (Nouveau-Brunswick) E9A 1T6. Telephone: (506) 876-3937. The Manager is Camille-Ernest Daigle.

Rights ASB Greenworld Ltd. holds Peat Lease No. 19 (627 ha – Peatland 324E) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatland 324E is in Pointe-Sapin, Kent County (Figure 9: 6).

History The company began site preparation in 1978. A peat lease was issued in 1982. In 1997, a plastic bag extruding and printing facility was added to the processing plant.

PRODUCTION The company produces milled peat (vacuum and Haku methods) and peat–soil growing mixes.

DEVELOPMENT The company continued to work toward the development of new peat-based growing mixes.

EMPLOYEES In 1999, 15 to 55 persons.

Beausejour Peat Moss Inc.

COMPANY Beausejour Peat Moss Inc., R.R. #1, boîte 58, Shédiac (Nouveau-Brunswick) E0A 3G0. The President is Paul-Émile Leger. Telephone: (506) 532-1172.

RIGHTS The company holds Peat Lease No. 37 (167 ha – Peatland 76) under the *Quarriable Substances Act*, Chapter Q-1.1 S.N.B. 1991.

LOCATION This bog is approximately 5 km southeast of Shédiac, Westmorland County (Figure 9: 7).

HISTORY In 1991, Beausejour Peat Moss Inc. applied for a Peat Exploration Licence for portions of Peatland 76 held by the Crown. During the same year, the company acquired freehold land in the northeastern sector of Peatland 76. In 1992, the licence application was dropped in favour of an Option. Peat extraction began on freehold land. In 1993, the company applied for and received a Peat Exploration Licence. A Peat Lease was issued for the Crown portion of the bog in 1994.

PRODUCTION The company produces milled peat and peat-based compost products.

DEVELOPMENT Development of the production area continued.

EMPLOYEES In 1999, 3 to 26 persons.

Compagnie de Tourbe Fafard ltée

COMPANY Compagnie de Tourbe Fafard ltée / Fafard Peat Moss Co. Ltd., 422, chemin Pallot, Inkerman (Nouveau-Brunswick) E8P 1B5. Telephone: (506) 336-9715. The Manager is Denis Mallet.

RIGHTS Compagnie de Tourbe Fafard ltée holds Peat Lease Nos. 4 (218 ha – Peatland 530), 5 (505 ha – Peatland 532), 6 (607 ha – Peatland 529), 22 (206 ha – Peatland 353), 25 (393 ha – Peatland 41) and 34 (398 ha – Peatland 40) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 530 is off Route 113 at Inkerman, Peatland 532 is 15 km south of Shippagan and Peatland 529 is 8 km southwest of Shippagan, all in Gloucester County (Figure 9: 8); Peatlands 40 and 41 are located near Birch Ridge, Kent County (Figure 9: 8a); Peatland 353 is located 3 km southwest of Burnt Church, Northumberland County (Figure 9: 8b).

HISTORY Compagnie de Tourbe Fafard ltée began operations in New Brunswick in 1942 by opening a bog near Shippagan (Peatland 530). New plants were opened in 1955 at Inkerman (Peatland 532) and in 1960 at Évangéline (Peatland 529). Initial production was block-cut peat but by 1973 the entire operation had changed to the production of milled peat. Since 1985, the production of peat mixes has become an important aspect of the New Brunswick operation. A perlite–vermiculite processing plant and a new peat-based growing mix plant were built at Peatland 532 in 1989. In 1998, the company completed a major corporate restructuring plan. Conrad Fafard, Inc. became a major shareholder of Québec-based Les Produits Horticoles Fafard ltée, which previously had controlling interest in la Compagnie de Tourbe Fafard ltée. A new company and wholly owned subsidiary of Conrad Fafard, Inc. named Fafard Products, Inc. was created, with head office in Inkerman, New Brunswick. That holding company is also majority shareholder of Compagnie de Tourbe Fafard ltée.

In 1987, Compagnie de Tourbe Fafard ltée acquired the operation of Les Équipements Tardif Inc. on Peatland 41 (Division Kent). Production from Peatland 41 had begun in 1984. In 1991, a peat lease was issued for adjacent Peatland 40. Production from that site began in 1999.

In 1988, Compagnie de Tourbe Fafard ltée acquired the assets of Burnt Church Peat Moss Co. Ltd. (Peatland 353 - Division Burnt Church). Production from the site began in 1991. A bagging plant was constructed in 1995.

PRODUCTION The company produces milled peat. Peat-based growing mixes are manufactured at the Inkerman plant (Peatland 532).

DEVELOPMENT Continued development of production fields at Burnt Church and Kent mine sites. Peatland restoration work is being done on abandoned parcels of land at the Évangéline site in cooperation with a Université Laval research group headed by Dr. Line Rochefort.

EMPLOYEES In 1999, 12 to 204 for the combined operations.

Les Entreprises Jean-Eudes Martin et Fils ltée

COMPANY Les Entreprises Jean-Eudes Martin et Fils ltée, 4092, boul. des Fondateurs, Saint-Isidore (Nouveau-Brunswick) E8M 1G3. The President is Sylvie Martin. Telephone: (506) 358-9800.

RIGHTS The company operates on its own land.

LOCATION Peatland 541 is located in Tracadie-Sheila, Gloucester County, along Highway 11 (Figure 9: 9).

HISTORY The project was registered with the Department of the Environment early in 1997 and received approval in June 1997. Production of peat began in 1997.

PRODUCTION The company produces milled peat and sells it unprocessed, in bulk.

DEVELOPMENT The company continued to develop its production area.

EMPLOYEES In 1999, 0 to 3 persons.

Good Earth Canada Ltd.

COMPANY Good Earth Canada Ltd., 5960 Broadway, Lancaster, N.Y. 14086, United States of America. Telephone: (716) 684-8111. The President is Guenther Burkhardt.

RIGHTS Good Earth Canada Ltd. holds Peat Lease No. 30 (734 ha – Peatland 338) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 338 is in Escuminac, 50 km east of Miramichi, Northumberland County (Figure 9: 10).

HISTORY The company was issued a peat lease in 1986 following the cancellation of Peat Lease No. 21 (Gulf Peat Co. Ltd.) in January 1986. Production began in 1987.

PRODUCTION The company produces milled peat and peat-based growing mixes.

DEVELOPMENT No new development to report.

EMPLOYEES In 1999, 2 to 22 persons.

Grande Anse Peat Moss Co. Ltd.

COMPANY Grande Anse Peat Moss Co. Ltd., C.P. 90, 70, avenue de la Tourbe, Grande-Anse (Nouveau-Brunswick) E8N 2T9. Telephone: (506) 732-2854. The Manager is Patricia Whelton.

RIGHTS Grande Anse Peat Moss Co. Ltd. holds Peat Lease No. 8 (166 ha) on Peatland 561, under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 561 is in the village of Grande-Anse, Gloucester County (Figure 9: 11).

HISTORY The company started a manual block-cut operation in 1961, which was mechanized in 1966. The conversion to a milled peat operation began in 1977.

PRODUCTION The company produces milled peat.

DEVELOPMENT No new development to report.

EMPLOYEES In 1999, 7 to 60 persons.

Le Groupe Berger ltée

COMPANY Le Groupe Berger ltée, 121, R.R. #1, St-Modeste (Québec) G0L 3W0. The President is Claudin Berger. Telephone: (418) 862-4462. The contact person is Andreas Avenriep. Telephone : (506) 228-9801.

Rights Le Groupe Berger ltée holds Peat Lease Nos. 29 (603 ha – Peatland 337), 33 (159 ha – Peatland 354) and 39 (261 ha Peatland – 324N) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatland 337 is 2 km north of St-Camille, Peatland 354 is 35 km southwest of Bay du Vin, and Peatland 324N is 10 km southeast of Eel River Bridge; all are in Northumberland County (Figure 9: 12).

History In 1985, Le Groupe Berger ltée acquired a Peat Exploration Licence that was converted to Peat Lease No. 29 in 1986. Production on Peatland 337 began in 1987. In 1988, Le Groupe Berger ltée applied for and received a Peat Exploration Licence for Peatland 354. Peat Lease No. 33 was issued in 1991. Production from Peatland 354 began in 1992. On December 31, 1996, Berger Inc. transferred all of its assets to Le Groupe Berger ltée, a federally chartered company.

Production The company produces milled peat and peat mixes.

Development The company continued to expand its production fields on Peatlands 337 and 354. A perlite expanding facility was constructed at the St-Camille site. A new peat lease arrangement was concluded with the company in January for the northeastern sector of Peatland 324N. A peat mix processing line was put in operation at the St-Camille operation at the end of the year.

Employees In 1999, 65 to 142 persons.

Le Groupe Qualité Lamèque ltée

Company Le Groupe Qualité Lamèque ltée / Lameque Quality Group Ltd., 36, rue de la Tourbe, Lamèque (Nouveau-Brunswick) E8T 1A3. Telephone: (506) 344-2293. The President is Florent Chiasson.

Rights Le Groupe Qualité Lamèque ltée holds Peat Lease Nos. 7 (202 ha – Peatland 600), 14 (142 ha – Peatland 580), 16 (413 ha – Peatlands 516 and 517), 17 (115 ha – Peatland 576) and 28 (104 ha – Peatland 578) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatlands 580 and 578 are 4 km north of Lamèque (Figure 9: 13a) and Peatland 576 is 4 km east of Haut-Lamèque (Figure 9: 13b), Gloucester County; Peatlands 516 and 517 are 1.5 km east of Rivière-du-Portage, Northumberland County (Figure 9:13c); and Peatland 600 is on Pokesudie Island, Gloucester County (Figure 9: 13d).

History Established in 1971, La Tourbière de Lamèque ltée became a division of Le Groupe Qualité Lamèque ltée (La Tourbière de Lamèque / Lameque Peat Moss) in 1989. Production on Peatland 578 began in 1989. In 1993, a fire destroyed the main processing plant in Lamèque. The plant became operational again during the summer of 1994. Production on Peatland 576 began in 1980.

La Tourbière de St-Raphaël ltée became a division of Le Groupe Qualité Lamèque ltée (La Tourbière de St-Raphaël / St. Raphaël Peat Moss Ltd.) in 1989.

Portage Peat Moss Ltd. had started commercial production from Peatlands 516 and 517 in 1972. In 1985, Les Produits Canadien Suprême ltée, a former affiliated company of Le Groupe Qualité Lamèque ltée, acquired the operation. The operation is now a division of Le Groupe Qualité Lamèque ltée (Les Produits Canadien Suprême / Canadian Supreme Products Ltd.). In 1989, the company suspended operations. A resource evaluation survey was completed in 1990. In 1991, production resumed in selected areas; the peat is trucked to the Lamèque facility for blending and processing.

In 1960, a peat lease was granted to Bushland Products Limited and in 1967 was transferred to Atkins & Durbrow (N.B.) Ltd. Following a disastrous fire in 1978, the plant was rebuilt and production resumed in late 1980. La Tourbière de Pokesudie ltée / Pokesudie Peat Moss Ltd., a former subsidiary company of Le Groupe Qualité Lamèque ltée, acquired the property in 1988. The company became a division of Le Groupe Qualité Lamèque ltée (La Tourbière de Pokesudie / Pokesudie Peat Moss) in 1989. Part of the mine site is now abandoned and has been reclaimed for agriculture (cranberry fields and associated water reservoir).

PRODUCTION The company produces milled peat and growing mixes.

DEVELOPMENT Expansion of production area and increasing activity level at the Rivière-du-Portage site.

EMPLOYEES In 1999, 33 to 118 persons.

Heveco Ltd.

COMPANY Heveco Ltd., 4534, Route 11, Tabusintac, (Nouveau-Brunswick) E9H 1J4. Telephone: (506) 779-9277. The Manager is Rolf Mecking.

RIGHTS Heveco Ltd. holds Peat Leases No. 9 (1080 ha – Peatland 524) and No. 24 (174 ha – Peatland 522) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 524 is 2 km southeast of Tabusintac and Peatland 522 is located 2 km east of Brantville, Northumberland County (Figure 9: 14).

HISTORY Incorporated in 1962, the company is the only major Canadian producer of block-cut peat. Since 1981, it also has produced milled peat. Production on Peatland 522 began in 1989. The plant was extensively modernized in 1995.

PRODUCTION The company produces block-cut peat, milled peat, and peat-based growing mixes.

DEVELOPMENT Some block-cut fields have been resurfaced to accommodate the milled peat operation. Opening of new production areas continued.

EMPLOYEES In 1999, 27 to 97 persons.

Malpec Peat Moss Ltd.

COMPANY Malpec Peat Moss Ltd., C.P. 118, Rexton (Nouveau-Brunswick) E0A 2L0. Telephone: (506) 523-9161. The Manager is Joe Curry.

Rights Malpec Peat Moss Ltd. holds Peat Lease No. 20 (499 ha – Peatland 213) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatland 213 is 3 km west of Rexton, Kent County (Figure 9:15).

History The company is affiliated with Southern Importers, Inc., Greensboro, North Carolina, United States of America. It was issued a peat lease in 1982 and began production of milled peat in 1985. In 1995, the lease was expanded by about 250 ha. In the spring of 1997, a fire destroyed the bagging plant. The plant was rebuilt and full production resumed in 1998.

Production The company produces milled peat.

Development Field preparation in the northern part of the lease.

Employees In 1999, 8 to 83 persons.

La Mousse Acadienne (1979) ltée

Company La Mousse Acadienne (1979) ltée / Acadian Peat Moss (1979) Ltd., C.P. 2002, Lamèque (Nouveau-Brunswick) E8T 3N3. Telephone: (506) 344-2225. The President is Gilles Haché.

Rights La Mousse Acadienne (1979) ltée holds Peat Lease No. 13 (232 ha – Peatland 568) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991. Three affiliated companies also hold peat leases: La Tourbe Chiasson ltée / Chiasson Peat Moss Ltd. (Peat Lease No. 23, 76 ha, Peatland 567); Tourbière Miramichi ltée / Miramichi Peat Ltd. (Peat Lease No. 31, 770 ha, Peatland 3); and La Tourbière Rivière de l'Anguille ltée / Eel River Peat Moss Ltd. (Peat Lease No. 36, 580 ha, Peatland 301).

Location Peatland 568 is adjacent to the Coteau Road on Lamèque Island, Gloucester County (Figure 9: 16a); Peatland 567 is 3 km southeast of Petit-Shippagan, Gloucester County (Figure 9: 16b); Peatland 3 is 6 km northeast of St.Margarets, Northumberland County (Figure 9: 16c), and Peatland 301 is 8 km southwest of Eel River Bridge, Northumberland County (Figure 9: 16d).

History Established in 1965, the company began production on Peatland 568 in 1966. Peat Lease No. 23 was obtained in 1982. Before 1987, all the production from Peatland 567 was processed at the facilities of La Mousse Acadienne (1979) ltée. A bagging plant was installed on Peatland 567 in 1987. Peat Lease No. 31 was obtained in 1988 and production from Peatland 3 began in 1989. Peat Lease No. 36 was obtained in 1994.

Production The company and its affiliates produce milled peat.

Development Production began on Peatland 301. Restoration plans have been prepared for portions of Peatland 568 that are coming out of production.

Employees In 1999, 19 to 121 persons for the four combined operations.

PaSi Peat Inc.

COMPANY PaSi Peat Inc., 4 Edison Street, St. Margarets, New Brunswick E1N 3A1. The contact person is Paul Sippley. Telephone: (506) 773-3102.

RIGHTS The company is operating on its own land.

LOCATION Peatland 324W is south of Eel River Bridge, Northumberland County (Figure 9: 17).

HISTORY Field development began in 1998. Production started in 1999.

PRODUCTION The company produces milled peat and sell it unprocessed, in bulk.

DEVELOPMENT No new development to report.

EMPLOYEES In 1999, 0 to 3 persons.

Premier Horticulture ltée – Division Rogersville

COMPANY A subsidiary of Entreprises Premier CDN ltée, 1, ave Premier, C.P. 2600, Rivière-du-Loup (Québec) G5R 4C9. The contact person is Michel Vachon, Director of Operations. Telephone: (418) 862-6356.

RIGHTS Peat Leases No. 35 (769 ha – Peatland 16) and No. 38 (199 ha – Peatland 14), under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatland 16 is on Highway 126, 3 km south of Rogersville in Kent County (Figure 9: 18a). Peatland 14 is located 30 km west of Rogersville in Northumberland County (Figure 9: 18b).

HISTORY Entreprises Premier CDN ltée applied for a Peat Exploration Licence in 1991 and a licence was issued in that same year. In 1992, a Peat Lease was issued to the newly formed subsidiary company. Initial production of peat began in 1994. A bagging plant was constructed in 1995.

PRODUCTION The company produces milled peat.

DEVELOPMENT Development of production fields continued. The company acquired a lease for Peatland 14. Field preparation and ditching started early in 1999.

EMPLOYEES In 1999, 2 to 31 persons.

Sun Gro Horticulture Canada Ltd.

COMPANY Sun Gro Horticulture Canada Ltd., 124, chemin de la Tourbe, Maisonnette (Nouveau-Brunswick) E8N 1P8. Telephone: (506) 727-3428. The Manager is Clarence Breau.

RIGHTS Sun Gro Horticulture Canada Ltd. holds Peat Lease Nos. 10 (1405 ha – Peatlands 591 and 592) and 12 (396 ha – Peatland 562) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatlands 591 and 592 are 3 km southeast of Lamèque and Peatland 562 is 6 km west of Maisonnette, all in Gloucester County (Figure 9: 19).

HISTORY In 1964, Western Peat Company Ltd., a Canadian company owned by Red Wing Peat Corporation (USA), established a base of operations at Maisonnette (Peatland 562). In 1970, Red Wing Peat Corporation purchased Atlantic Peat Moss Co. Ltd. at Shippagan (Peatlands 591, 592 and 527). Atlantic Peat Moss Co. Ltd. had produced from Peatland 527 (1953–1971) and from Peatland 591 since 1952.

In 1974, S.B. McLaughlin Associates Limited of Toronto, Ontario, purchased the holdings of the major shareholder, Red Wing Peat Corporation, and assumed control. This was followed by the combination of the business operations of Western Peat Company Ltd. and Atlantic Peat Moss Co. Ltd. into Western Peat Moss Limited.

In 1980, Fisons, a British company, acquired a 50% interest in Western Peat Moss Limited. The joint venture company was renamed Fisons Western Peat Moss Limited and then changed to Fisons Western Corporation in January 1982, when Fisons acquired the remaining McLaughlin interests. Production from Peatland 527 ceased in 1971 due to fire hazard to the town of Shippagan and the site was converted to Peat Lease No. 26 in 1984. The new plant on Lamèque Island (Peatland 591) opened in 1981. The company changed its corporate name to Fisons Horticulture Inc. in 1989.

In 1993, Fisons Horticulture Inc. was acquired by Sun Gro Horticulture Inc. The New Brunswick operation is managed by Sun Gro Horticulture Canada Ltd.

Former Peat Lease No. 26 was terminated in 1994 after appropriate restoration work had been completed.

PRODUCTION The company produces milled peat and peat-based growing mixes.

DEVELOPMENT Continued expansion of production fields on Peatland 591. Peatland restoration work is being done on abandoned parcels of land at the Lamèque site in cooperation with a Université Laval research group headed by Dr. Line Rochefort.

EMPLOYEES In 1999, 44 to 150 persons.

Theriault & Hachey Peat Moss Ltd.

COMPANY Theriault & Hachey Peat Moss Ltd., 201, chemin Theriault-Hachey, Baie-Sainte-Anne (Nouveau-Brunswick) E9A 1N7. Telephone: (506) 228-4530. Elphège Theriault is President. The Chief Executive Officer is Gary Williston.

RIGHTS Theriault & Hachey Peat Moss Ltd. holds Peat Lease No. 11 (482 ha – Peatland 324W) and Peat Lease No. 27 (125 ha – Peatland 302A) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

LOCATION Peatlands 324W and 302A are 6 km south of Eel River Bridge, Northumberland County (Figure 9: 20).

History The company was formed in 1963 but block-cut peat had been produced from the site since 1961. In 1977, the block-cutting operation was converted to a milled peat operation. The company acquired a peat lease on Peatland 302A in 1985. Production on Peatland 302A began in 1990. A new processing plant was built in 1994.

Production The company produces milled peat.

Development New fields continue to be opened on Peatland 302A.

Employees In 1999, 8 to 58 persons.

La Tourbe de Pigeon Hill ltée

Company La Tourbe de Pigeon Hill ltée, C.P. 2067, 76 rue du Pêcheur, Lamèque (Nouveau-Brunswick) E8T 3N5. Telephone: (506) 344-5653. The President is Edmond Chiasson.

Rights La Tourbe de Pigeon Hill ltée holds Peat Lease No. 18 (234 ha – Peatland 569) under the *Quarriable Substances Act*, Chapter Q-1.1, S.N.B. 1991.

Location Peatland 569 is in Pigeon Hill on Lamèque Island, Gloucester County (Figure 9: 21).

History A peat lease was issued in 1979.

Production The company produces milled peat.

Development Continued expansion of production fields.

Employees In 1999, 1 to 19 persons.

La Tourbière de Petit-Shippagan

Company La Tourbière de Petit-Shippagan, C.P. 2130, Lamèque (Nouveau-Brunswick) E8T 3N7. The contact person is François-Robert David, Director of Operations. Telephone (506) 344-8064.

Rights The company is operating on its own land.

Location Peatland 579 is 7 km northeast of Lamèque, on the road to the Miscou bridge, Gloucester County (Figure 9: 22).

History The project was registered with the Department of the Environment early in 1993 and received approval in July 1993. Production of peat began in 1994.

Production The company produces milled peat and sells it unprocessed, in bulk.

Development No new development.

Employees In 1999, 1 to 7 persons.

La Tourbière du Centre de l'Île ltée

Company La Tourbière du Centre de l'Île ltée, 264, rue du Pêcheur Nord, Lamèque (Nouveau-Brunswick) E8T 1K2. The contact person is Pierrette Savoie. Telephone: (506) 344-8236.

Rights The company is operating on its own land.

Location Peatland 580 is in the town of Lamèque, Gloucester County (Figure 9: 23).

History The project was registered with the Department of the Environment in 1994 and received approval in November 1995. Production of peat began in 1996.

Production The company produces milled peat and sells it unprocessed, in bulk.

Development No new development.

Employees In 1999, 0 to 3 persons.

Potash, Salt

Following its discovery in 1971, potash rapidly became a major contributor to the value of industrial mineral production in New Brunswick. In terms of its impact on the total value of minerals produced in the Province, potash remains second only to zinc. Until 1996, New Brunswick potash producers accounted for roughly 10% of Canada's productive capacity and between 10 and 15% of its annual production.

New Brunswick's two world-class potash mining and processing facilities (the Potash Corporation of Saskatchewan Inc. Cassidy Lake [formerly the Potacan Mining Company] and New Brunswick divisions) are situated in the southeastern part of the Province near the Town of Sussex. The Cassidy Lake operation presently serves the custom processing and selected value-added aspects of the company's business while the "New Brunswick" operation functions as an integrated mine/mill facility.

Potash Corporation of Saskatchewan Inc. (Cassidy Lake Division)

Company Potash Corporation of Saskatchewan Inc. (Cassidy Lake Division) [PCS (Cassidy Lake)], Contact is Raoul Gauthier, General Manager, Potash Corporation of Saskatchewan Inc. (Cassidy Lake Division). Telephone: (506) 433-5445. Mine address is P.O. Box 1489, Sussex, New Brunswick E4E 5L2. Site Superintendent is Wally Farrah. Telephone: (506) 839-2146. Corporate office: Potash Corporation of Saskatchewan Inc., 122 – 1st Avenue S., Suite 500, Saskatoon, Saskatchewan S7K 7G3. Website: *www. potashcorp. com.*

Rights Potash Corporation of Saskatchewan Inc. (Cassidy Lake Division) holds a Potash Agreement (858.7 ha), under Section 25(2) of the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

Location The PCS(Cassidy Lake) processing operation (Figure 9: 24) is situated about 20 km southwest of Sussex, Kings County (NTS 21 H/12E).

HISTORY Potash and salt were discovered in the Salt Springs area by the New Brunswick Department of Natural Resources in 1973. Subsequent exploration and development rights to a 120 km^2 reservation area were granted to International Minerals and Chemical Corporation (IMC). Full-scale exploration (22 drill holes) began in 1975, and was successful in confirming a significant ore body. Despite extremely encouraging results from the drilling program, IMC sold the property to Denison Mines Limited of Toronto in the latter part of 1978. Construction of a 5-m-diameter exploration mine shaft was commenced in September, 1979, and reached a target depth of 835 m by 1982.

In December 1980, Denison Mines Limited assigned a 40% interest in the property to Potash Company of Canada Limited (Potacan). Potacan, owned jointly by Entreprise Minière et Chimique, and Kali und Salz AG, handled potash sales while Denison was the overall development manager.

A feasibility study completed in 1982 resulted in a production decision announcement on February 7, 1983. Work on the No. 2 shaft, the production shaft, commenced in 1983, along with continued underground development and the construction of the surface infrastructure related to the mill facility, tailings storage, and brine disposal. By July, 1985, all pre-production work was completed and the first shipment of potash was destined for Colombia on September 17, 1985.

Because of financial difficulties, Denison sold its interest in the property to its Potacan partners in 1991 and the name was subsequently changed to the Potacan Mining Company (PMC).

Throughout most of its 12 years of operation, Potacan generally maintained production levels greater than 75 % of its rated 1 300 000 product tonne capacity and had established itself as the Province's largest potash mining and milling facility. In the spring of 1997, water inflow occurred in the underground. Following unsuccessful attempts to reduce the flow to a manageable level, PMC's parent company, the Potash Company of Canada, announced the permanent suspension of operations at the Cassidy Lake mine about 6 months later. A plan was implemented to dispose of all surface tailings and carry out remedial site work. This closure reduced the Province's productive capacity by almost two thirds and resulted in the loss of hundreds of jobs.

Early in 1998, the former Potacan operation was purchased by the Potash Corporation of Saskatchewan Inc. The facility, now called *Potash Corporation of Saskatchewan Inc. (Cassidy Lake Division)* utilizes the existing processing facility and related infrastructure to upgrade standard-grade potash imported from company operations in western Canada. The result is a higher-value granular product supplied to markets in eastern Canada and the United States. Both PCS operations in the Sussex area are linked by rail to the port of Saint John, 60–70 km to the west, a critical marketing advantage in the efficient global distribution of this important commodity.

RESERVES AND GRADE Not available

PRODUCTION Production ceased in 1997. The Potash Corporation of Saskatchewan Inc.operates a custom processing facility on the property, which has an annual compaction capacity of 1 000 000 t of granular potash product. In 1999, 197 000 t of standard grade product from the company's Rocanville, Saskatchewan operation was compacted to granular grade material and exported to the eastern United States and Canada (Potash Corporation of Saskatchewan. 1999. "Resourceful." Company annual report, p. 9).

Employees 31 persons in 1999

Development In March 1998, the Potash Corporation of Saskatchewan Inc. purchased all outstanding shares from Potacan's holding company, the Potash Company of Canada Limited (an equal partnership between Kali und Salz of Germany and Entreprise Minière et Chemique of France). PCS is using the former Potacan mill to upgrade standard product from its Rocanville operation in western Canada into a higher-value granular product (annual granular capacity of 1 000 000 t). A new and efficient rail car unloading facility has been installed to accommodate the efficient offloading of imported standard grade product.

Potash Corporation of Saskatchewan Inc. (New Brunswick Division)

Company Potash Corporation of Saskatchewan Inc. (New Brunswick Division) [PCS(NB)], P.O. Box5039, Sussex, New Brunswick E4E 5L2. Telephone: (506) 433-5445. The General Manager is Raoul Gauthier. Corporate office: Potash Corporation of Saskatchewan Inc., 122 – 1st Avenue S., Suite 500, Saskatoon, Saskatchewan S7K 7G3. Website: *www. potashcorp. com.*

Rights Potash Corporation of Saskatchewan Inc. (New Brunswick Division) holds a Potash Agreement (19165.5 ha), under Section 25(2) of the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

Location The PCS(NB) mine/mill facility (Figure 9: 25) is on the north side of Highway 2, about 5 km east of Sussex, Kings County (NTS 21 H/11W, 21 H/14W).

History Following the discovery of potash in the Plumweseep–Penobsquis area by the New Brunswick Department of Natural Resources in 1971, exploration and development rights covering a 360 km^2 reservation area were granted to the Potash Company of America in 1973. After a comprehensive exploration program and feasibility study, the company proceeded with the construction of a 5-m-diameter exploratory mine shaft in the spring of 1978. The exploration shaft was completed in April and underground exploration was completed in October of 1980. On October 27, 1980, the Potash Company of America announced that it was proceeding to production with a mine capacity of 900 000 t/a although initial capacity would be 630 000 t/a.

Mine development, mill construction, and the Courtenay Bay potash shipping terminal in Saint John were completed in 1983. The first potash was produced from the mill on July 17, 1983. The first shipment of potash through the port facility in Saint John took place early in 1984.

After purchasing PCA early in 1986, Rio Algom Limited spent more than $30 000 000 on improvements designed to bring the Sussex mine up to its rated capacity of 635 000 product tonnes per year by April of 1987.

In 1993, the assets of Potash Company of America (a Division of Rio Algom Limited), including the New Brunswick mine and the Saint John port facility, were acquired by Potash Corporation of Saskatchewan Inc.

Reserves and grade On the basis of geophysics, surface and underground exploration drilling and mine development, PCS(NB) believes the mine has a proven reserves of 48 000 000 t of recoverable ore and 16 600 000 t of estimated finished product. Based on these proven reserve estimates, the operation has a reserve (proven) life of at least 21 years at current rates of productive capacity (785 000 t of KCl product in 1999) and current technology (Source: PCS 10-K Form filed 3/28/1999). Probable reserves have been reported at 200 000 000 t with 72 000 000 t of estimated finished product. Combined proven and probable reserves indicate a reserve life of a century at full current productive capacity and established technology (PCS 10-K Form filed 3/28/2000, p. 5)

PRODUCTION Potash and salt production commenced in 1983. PCS(NB) has an annual production capacity of 785 000 t KCl (Potash Corporation of Saskatchewan. 1999. "Resourceful." Company annual report, p. 9). In 1999, 693 000 t of KCl was produced, down 12.5% over the record of 783 000 t achieved in 1998 (Potash Corporation of Saskatchewan. 1999. "Resourceful." Company annual report, p. 9). Despite financial uncertainty following the devaluation of its currency in the first half of 1999, Brazil continued as a major market for PCS potash. Brazil accounted for over 400 000 t or 58% of its PCS New Brunswick Division's production in 1999 (Potash Corporation of Saskatchewan. 1999. "Resourceful." Company annual report, p. 14) . Although production at the mine was down slightly in 1999, potash shipments from the Port of Saint John were reported at 1 100 000 t, a 31 % increase over 1998 tonnage figures (Saint John Port Authority) .

In conjunction with its potash mining operation PCS(NB) also has mined up to 650 500 t of salt annually. Some is consumed regionally; however, most is trucked to and exported from the Port of Saint John. The material is sold exclusively to the salt division of Cargill Incorporated. Although production of this mineral commodity has expanded over the last few years, 1999 witnessed a slight decline in shipments out of the Saint John port facility for the second straight year. Salt shipments through the port were reported to be 157 000 t in 1999, compared to 192 000 t in 1998 and 287 000 t in 1997.

EMPLOYEES Average of 398 persons for 1999.

DEVELOPMENT Late in the spring of 1998, a small brine inflow was discovered in a section of the mine. Since its detection, PCS (NB) officials have been vigilant in their analysis of the situation. The inflow continued throughout 1999, controlled at 400 gallons per minute (Potash Corporation of Saskatchewan. 1999. "Resourceful." Company annual report, p. 9). Extensive geotechnical studies including a three-dimensional seismic survey were undertaken in 1999 to assist in developing an appropriate strategy to further control and eventually eliminate the situation. Throughout 1999, considerable progress was made in establishing a grout curtain above the mine to seal off the inflow. The inflow did not affect production at PCS(NB) in 1999.

Limestone, Dolomite, Marl

The upward production trend established in recent years at New Brunswick's limestone and dolomite operations continued throughout 1999 with production exceeding the 1 000 000 t mark for the first time in the province's history. A significant proportion of this recent production record is sustained by the aggregate demand of new highway construction and related infrastructure in southern New Brunswick. Production is expected to level off to 700 000 and 900 000 t upon completion of several projects over the next few years. In 1999, limestone and dolomitic limestone were processed from five operations (Havelock Lime, a Division of Goldcorp Inc. of Havelock; Lafarge Canada Inc. of Havelock; Brookville Manufacturing of Saint John; Elmtree Resources Ltd. near Bathurst and Upper Kent Lime Works, north of Bristol). The industry manufactures a range of chemical and pulverized products featuring agricultural, calcined and hydrated lime, flue gas desulphurization limestone as well as aggregate. In recent years there has been considerable research targeted at developing new value-added lime and limestone product lines.

Brookville Manufacturing Company

COMPANY Brookville Manufacturing Company, P.O. Box 2332, Station C, Saint John, New Brunswick E2L 3V6. Telephone: (506) 633-1200. The company's owner and General Manager is Malcolm Hoar.

RIGHTS Mineral rights through Original King's Land Grant.

LOCATION Brookville, East Saint John, Saint John County (Figure 9: 26). The quarry and crushing operations are between Highway 1 (Sussex–Saint John Highway) and Highway 100 (Rothesay Highway), approximately 2 km east of their junction. Access to the quarry is via the Rothesay Highway (NTS 21 H/5).

HISTORY The limestone/dolomite quarry and processing facility established at Brookville Manufacturing has a history of continuous operation for over 75 years (1920). The privately owned company primarily produces pulverized limestone and dolomitic limestone for the agricultural industry, a wide range of construction aggregate materials and other products.

Brookville, originally owned and operated by H.G.S. Adams, remained a family business until 1972 when it was purchased by Moosehead Breweries of Saint John. Moosehead succeeded in running the business almost 25 years before selling to its present owner and former Brookville employee, Malcolm Hoar, in 1994–95.

RESERVES AND GRADE Although resource estimates of limestone and dolomite at Brookville are not publicly available it appears there is an adequate stone supply for many years depending on its quality and availability at present levels of production. In 1998, a company official reported "about 70 years left in the life of the dolomite limestone quarry" (Heavy Construction News, June, 1998).

The calcium and magnesium content of the stone varies throughout the quarry, from areas of high-calcium limestone to areas of high-magnesium dolomite. Most production is centered in the more dolomitic areas where grades fluctuate from 40 to 45% $MgCO_3$.

PRODUCTION The company, which quarries and processes 200 000 to 300 000 t of limestone/dolomite each year, produces dolomitic agricultural lime, a wide range of aggregate for construction and other related purposes. Apart from New Brunswick, the company has marketed materials in Nova Scotia, Prince Edward Island, and the states of Maine, New Hampshire and Massachusetts (Management's discussion and analysis: 1999 Consoldiate financial statements, Goldcorp Inc.).

The company has a long-standing history supplying aggregate to the concrete industry. In 1998 Brookville was chosen to supply concrete aggregate for 15 000 m of pre-stressed concrete girders to be used on a major 195 km highway construction project between Fredericton and Moncton in southern New Brunswick. The company maintains a stockpile of construction and agricultural materials in excess of 120 000 t utilized in the manufacture of more than 40 different products.

EMPLOYEES Average of 26 persons in 1999.

DEVELOPMENT Similar to other limestone operations in New Brunswick, Brookville has been considering various options directed at expanding its product line into several new value-added agricultural and related products. The company continues to be a major supplier of aggregate material in southern New Brunswick.

Lafarge Canada Inc.
(Havelock Quarry and Cement Plant)

COMPANY Lafarge Canada Inc. The plant address is 4877, Route 880, Havelock, New Brunswick E4Z 5C1. Telephone: (506) 534-2301. The Manager is Dave Clark. Website: *www. lafargecorp.com*

RIGHTS Lafarge Canada Inc. holds Mining Lease 245 (632.5 ha), which includes the existing plant and quarries, and Mining Lease under the *Mining Act*, Chapter M-14.1, S.N.B. 1985. The company also holds mineral claims on a limestone and a gypsum property near Havelock and Petitcodiac, respectively.

LOCATION The limestone quarries and cement plant (Figure 9: 27) are adjacent to Highway 880, about 5 km east of Havelock, Westmorland County (NTS 21 I/3W).

HISTORY Limestone quarries near the plant have been supplying raw material for the manufacture of cement since 1952. After 1982, production of cement from local raw materials was limited to fulfilling market requirements for oil well and other specialty cements. The plant was maintained as a grinding operation for imported Nova Scotia clinker until 1987 when the company closed its cement production facility; however, it continues to quarry stone used for other purposes. The plant property now serves only as a distribution point for products from another company operation in the Maritimes.

The McGee quarry was opened in 1986 just north of Highway 880, less than 1 km east of the plant. This property, partially investigated in 1976, was known to contain extensive reserves of high-calcium limestone. A drilling program was undertaken in 1985 to verify the quality and extent of the deposit prior to the establishment of the new quarry site.

Since opening the McGee quarry site, Lafarge has supplied limestone to an unrelated lime plant operating at Havelock. The operation has also supplied limestone from other quarry locations on its property for the manufacture of various specialty cement products at a company cement plant in Nova Scotia. Aggregate material to regional operations of Lafarge Construction Materials (i.e., ready-mix cement plants) has also been underway on as required basis for several years. The company continues with an impressive reclamation program at former quarry locations.

RESERVES AND GRADE Potential medium- to high-grade limestone (i.e., 50–53% CaO) resources are estimated to be fairly extensive on properties held under mining lease by Lafarge Canada Inc., although no specific values are publicly available. In addition, the company maintains a 288 ha claim block in the Springhill area several kilometres southwest of the former cement plant and its adjacent quarries.

PRODUCTION Historically, the company has produced up to 400 000 t of limestone annually, primarily for use in cement manufacturing. However, since the closure of its plant, 15 years ago, stone specifically quarried for cement production has been minimal. Despite the closure of its Havelock cement operation, Lafarge has continued to produce stone mostly from its McGee quarry, selling an estimated 400 000 t annually to Havelock Lime (a division of Goldcorp Inc.). Intermittent production in the range of a few tens of thousands of tonnes a year is shipped on demand to Lafarge's Nova Scotia cement manufacturing operation at Brookfield and other local markets.

EMPLOYEES 4 persons in 1999.

DEVELOPMENT. Lafarge Canada Inc.'s Havelock operation continued to supply limestone from its quarries in 1999. Approximately 60 000 t were shipped to the company's cement plant in Brookfield, Nova Scotia where it was processed into specialty cement product(s). In addition, 10 000 to 15000 t of aggregate material were supplied to the company's ready-mix concrete plant in Sussex and to special environmental projects in the region. Although now operated by Havelock Lime, Lafarge's McGee quarry continued to be the focus of a limestone supply arrangement that sees annual shipments of 400 000 t of rock going to the lime plant's calcination and related processing facility nearby. In another co-operative venture, Lafarge processed (i.e., crushed and screened) and stored about 40 000 of magnesium limestone for Havelock Lime. Lafarge also continued to reclaim quarries on its properties, nearly completing rehabilitation and reclamation work at its former "East Quarry" site and continuing reclamation efforts in parts of its occasionally active "West Quarry".

Elmtree Resources Ltd.

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is M. Buzas.

RIGHTS Elmtree Resources Ltd. holds Quarry Lease No. 27 (84.3 ha) under the *Quarriable Substances Act*, Chapter Q-1, R.S.N.B. 1968 as well as Mining Lease 247 (161.1 ha; Armstrong Brook), Mining Lease 248 (171.3 ha; Sormany) and Mining Lease 249 (245.94 ha; Elmtree) under the *Mining Act*, Chapter M-14.1, R.S.N.B. 1986.

LOCATION Elmtree operates a quarry and adjacent processing facility several kilometres west of Sormany, in northern New Brunswick (Figure 9: 28). The operation is about 30 km west of Bathurst, and adjacent to the Millstream River (NTS 21 O/9).

HISTORY Although the limestone near Sormany was mapped by J.L. Davies (Geological Surveys Branch) in 1959, it was not until 1982 that Elmtree Resources Ltd. mapped and sampled the deposit in detail. Two holes were drilled to further test the extent and grade continuity of the limestone at depth. Results were encouraging enough for the company to eventually proceed with quarry development and establish an on-site processing facility in the early 1990s.

In 1992, quarry operations shifted from the company's original Elmtree site near Petit Rocher to the present Sormany location, about 34 km to the southwest. All operations are consolidated at the Sormany site, with Elmtree's former location serving as a storage and distribution point for selected limestone products.

Reserves and Grades Initial exploration (early 1980s) indicated possible reserves in excess of 8 000 000 t of limestone. Recent and more detailed reserve estimates are not publicly available.

Production Between 40 000 and 50 000 t of flux-grade material is supplied annually to the nearby smelter at Belledune. In addition to this and other products, over 100 000 t of (>90% $CaCO_3$) limestone is supplied annually as a flue-gas desulphurization (FGD) agent to two hydrocarbon-fired power plants in northern New Brunswick. One facility is situated nearby (20 km) at Belledune while the other is at Dalhousie, 50 km north of the Elmtree operation.

Development A new quarry site was established a few hundred metres west of the original Sormany quarry in 1998. In 1999, both quarries were connected facilitating improved extraction efficiencies. The company is also considering development options on their Armstrong Brook dolomite property about 25 km west of Bathurst and plans to extract some stone for testing at their Sormany-based processing facility.

Employees Average of 15 persons in 1999.

Havelock Lime, a division of Goldcorp Inc.

Company Havelock Lime, 4634 Route 880, Havelock, New Brunswick E4Z 5K8. Telephone: (506) 534-2311. The General Manager is Frank Derrah. Website: *www. goldcorp. com*

Rights Goldcorp Inc. holds Mining Lease 243 (355.0 ha) and Mining Lease 244 (182.4 ha), under the *Mining Act*, Chapter M-14.1, S.N.B. 1985. Lease 243 includes the operating quarry at Samphill and Lease 244 includes the plant. The company also holds several claim blocks in the Havelock, Sussex and Canaan areas.

Location The company operates a quarry at Samp Hill (Figure 9: 29), about 5 km west of Havelock. A processing facility is situated less than 1 km east of the Village (NTS 21H/13W).

History Havelock Lime, formerly Havelock Lime Works Ltd., has been quarrying in the area since 1938. The original company was incorporated in 1964, and in 1970 a subsidiary company, Havelock Processing Ltd., was formed to manage the manufacturing of quick and hydrated lime. In 1984, Dickenson Mines Ltd. purchased 60% interest in the Havelock group of companies. In 1987, the remaining 40% were acquired.

In 1989, control of Dickenson Mines and it's affiliated companies were purchased by Goldcorp Inc. Fives years later (1994) the assets of Goldcorp, Dickenson, and two other companies were reorganized into a new corporate structure, Goldcorp Inc. At that time Havelock Lime's company name was modified to reflect the new corporate identity – Havelock Lime (a division of Goldcorp Inc.).

Since Dickenson's purchase of Havelock's assets, several improvements to the facility have been realized. Some of these have included the construction of a 330 t/d annular-shaft kiln (completed in 1989) to improve fuel economy, provide increased production capacity and provide long-term market competitiveness. A new 10 t/h hydrator improved production efficiency and in 1991, a wash plant was commissioned, providing better quality stone feed to the kiln.

In 1996, Havelock Lime's reputation as a marketer of quality lime products was enhanced by its qualification for the internationally recognized ISO 9002 quality assurance accreditation.

RESERVES AND GRADE Limestone requirements are partially supplied from the company's Samphill quarry with up to 400 000 t purchased annually from the neighboring Lafarge Canada Inc. quarry under the terms of a negotiated multiyear limestone supply agreement. In its 1997 Annual Report, Goldcorp Inc., Havelock's parent company, indicated that at the current rate of production, Havelock Lime had limestone reserves to last approximately 30 years. Although not fully delineated, total reserves from company holdings in the Havelock area were estimated at 8 300 000 tons (Goldcorp Inc., Annual Report, 1997).

PRODUCTION The company processes between 300 000 and 400 000 t of limestone annually. Chemical process stone (for use as flux in nonferrous smelters, the glass industry, pulp and paper mills, and fibreglass), pulverized stone (for use in dusting mines and for agricultural purposes), poultry grit, and crushed stone (for use as concrete aggregate and for general construction) are currently produced. Havelock's lime and related limestone product revenues for 1999 were reported at just over $12 000 000, representing a slight increase over 1998 largely due to significant growth in aggregate sales and strong sales in calcined and hydrated lime (Management's discussion and analysis: 1999 Consolidated financial statements, Goldcorp Inc.). Havelock remains the only source of quick and hydrated lime in the Maritimes.

EMPLOYEES An average of 53 persons in 1999.

DEVELOPMENT Over the last few years, Havelock Lime has been consolidating and extending reserves of high calcium limestone in the Havelock area. Proposed quarry expansions continued in 1999 with preliminary planning and predevelopment work undertaken at two locations. Development activity at Havelock's Samphill quarry will result in the extraction of over 1 700 000 t of construction aggregate over the next two years. Under the terms of a special agreement, the Maritime Road Development Corporation is removing and processing low-chemical-grade limestone and related overburden material from the Samphill quarry site to meet the strategic construction material requirements for the Fredericton to Moncton highway project in this part of New Brunswick. Excavation of this material will assist in the economic recovery of higher value, underlying reserves of steeply dipping, high-calcium limestone, thus extending life of the quarry by several years.

Havelock has been conducting considerable research targeted at developing new value-added lime and limestone product lines. Higher-value new products such as Hydra Lime+ (comprising hydrated lime, gypsum and magnesium limestone) should allow the company to penetrate markets not previously accessible with traditional agricultural lime products. In addition, the company is investigating stone at new test quarry site for its suitabilty as a raw material for the manufacture of precipitated calcium carbonate (PCC) used extensively as filler and coating in the pulp and paper industry. A favorable outcome of testing, market research and other related issues could result in a considerable expansion to Havelock's existing manufacturing facility in the near future. In the meantime, various projects are underway to improve processing efficiencies at the lime manufacturing plant.

To assist in funding requirements pertaining to the redevelopment of its Red Lake gold mine in northwestern Ontario, Goldcorp announced late in 1999 that it was selling the Havelock Lime operation. The sale was completed on December 31, 1999 for a reported net proceeds of US$ 20 588 000 (Cdn$29 650 000) to Graymont Ltd. of Vancouver, British Columbia (Heavy Construction News, June 1998).

Graymont is a privately owned Canadian corporation that through its wholly owned subsidiaries of Continental Lime, the Genlime Group, Graybec Calc Inc., and Bellefonte Lime Co. Inc. and other recent acquisitions, maintains the position of the third largest lime producing company in North America. The Havelock facility is to be known as Havelock Lime Ltd. and is to be closely associated with Graymont's three lime plants and associated quarries in Quebec operated by its subsidiary, Graybec Calc Inc.

Upper Kent Lime Works Ltd.

COMPANY Upper Kent Lime Works Ltd., R.R. 3, Bath, New Brunswick E0J 1E0. Telephone: (506) 278-5359. Contact person is Douglas Lloyd.

RIGHTS Upper Kent Lime Works Ltd. holds Mining Lease 242 (16.2 ha), under the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

LOCATION This marl deposit (Figure 9: 30) is in the bottom of a partially drained lake at Maplehurst, 15 km north of the Village of Bath (NTS 21 J/12).

HISTORY The deposit has been worked since the late 1950s and was acquired by the present owners in 1973.

RESERVES AND GRADE Less than 30 000 t of marl ranging between 85% and 95% $CaCO_3$ remain at this location.

PRODUCTION Marl is extracted from a shallow lake bottom using a dragline, spread on the adjacent hillside to dry, and stockpiled. It is then screened to remove pebbles, twigs, etc., and trucked to local farmers for use on potato fields. The main operating period is late April to June. An additional two- to three-week period of operation typically occurs in the fall to stockpile material. Annual sales vary but are generally less than 2000 t.

EMPLOYEES 3–4 persons (seasonal)

DEVELOPMENT Continued operation.

Silica

Atlantic Silica Inc.

COMPANY Atlantic Silica Inc., 266 Hillsborough Road, Riverview, New Brunswick E1B 4G7. Telephone: (506) 387-4648; Mine site telephone: (506) 433-5890. Fax: (506) 387-3080. President and General Manager is Robert Pickett.

RIGHTS Atlantic Silica Inc. (formerly Sussex Silica Inc.) holds Mining Lease 241 (599.8 ha), under the *Mining Act*, Chapter M-14.1, S.N.B. 1985.

LOCATION This deposit of unconsolidated silica sand and pebbles (Figure 9: 31) is about 16 km southwest of Sussex, immediately northeast of Cassidy Lake (NTS 21 H/12E).

History The deposit was discovered in 1981. After identifying sufficient reserves of high-quality sand, a pilot plant was set up in 1983 for product testing and marketing. Full-scale production began in 1986. In the fall of 1986, the company mined several thousand tonnes of lump silica and sand of various sizes. The lump silica was used in the manufacture of silicon metal and silicon carbide at Becancour, Québec. The company's assets were acquired in 1993 from Baskatong Quartz Ltd. (Sussex Silica Inc.)

Reserves and Grade In the late 1990s, company literature (Atlantic Silica fact sheet, 1997) reports proven reserves of 25 000 000 t of unconsolidated quartz sand and pebbles in association with minor amounts of kaolin clay. The silica approaches 100 % SiO_2, 0.04–0.15% Fe_2O_3; 0.02% CaO; 0.15% Al_2O_3 and trace amounts of TiO_2.

Production Existing capacity of the operation is estimated at 100 t/h.

Employees Average of 7 persons in 1999.

Development The company has marketed several specialty products, including sand blasting material; filtration, tree nursery, and decorative sands; and sands used in the manufacture of glass and fibreglass. In 1998, Atlantic began supplying silica for a Sussex-based manufacturer of agglomerated tiles for interior and exterior floor and wall applications.

Chaleur Silica (a Division of The Shaw Group)

Company Chaleur Silica (an operation of Shaw Resources), P.O. Box 60, Shubenacadie, Nova Scotia B0N 2H0. Telephone: (902) 883-2220. FAX: (902) 758-3622. Contact person is Glen Hardie. Website: *www. shawgroupltd.com*

Rights Shaw Group has a 27-acre lease agreement with the landowner.

Location The Bass River silica quarry (Figure 9: 32) is immediately south of Highway 11, approximately 6.5 km east of Bathurst, Gloucester County (NTS 21 P/12E).

History The property was originally explored by East Coast Smelting and Chemical Company in 1961, but the property remained undeveloped until 1974 when World Wide Explorations opened a small quarry. Purchased by Godin M-E in 1976, the operation was expanded and modernized. It was operated under the name Chaleur Silica Limited until the late 1980s. In 1992, the Shaw Group Limited of Nova Scotia purchased the company, changing the name of the operation to Chaleur Silica.

Reserves and grade An estimate of reserves is not available for this property. The resource is primarily a quartzose sandstone with an average SiO_2 content of 90%.

Production The quarry operates on a seasonal basis. The market depends almost entirely on the sale of silica flux to the Belledune smelter. Annual production is generally between 20 000 and 25 000 t of 0.5 inch minus material.

Employees Information is not available but the number is expected to be 2 to 3 seasonal.

DEVELOPMENT Material is excavated at Bass River and crushed and sized in Petit Rocher. Plans are to continue the operation depending on market demand and availability.

Dimension Stone

The quarrying and working of stone for various applications, once an important sector of New Brunswick's mining industry, continues to shown signs of a modest revival. Although there are several companies supplying stone products in the province, only a few actually quarry and process local stone. Both granite and sandstone are worked on demand.

In 1999, New Brunswick sandstone block was shipped to British Columbia, Ontario, and parts of the United States. Several local construction projects kept companies, like Maritime Stone Works Inc. in the Scoudouc area of southeastern New Brunswick, busy manufacturing ashlar cladding and several other related stone products.

There was also interest shown in developing flagstone, fieldstone and other natural stone resources throughout the province. For example in central New Brunswick, near Doaktown, the Central Stone Company, began preparations to establish a quarry site as a source of quality sandstone flagstone and related products for landscaping and other decorative applications destined for both the local and export markets.

The New Brunswick stone industry today bears no resemblance to that of former decades. Nonetheless, a few companies continue to quarry stone generally on demand in the southern part of the Province, shaping it into monuments, curbing, streetscaping and landscaping stone, stone for new buildings and restoration material. These companies include: Nelson Monuments Ltd. of Sussex, Smith Cut Stone and Quarries Limited of Shediac, Maritime Stone Works Inc. (formerly Bee Stone Company Inc.) of Scoudouc, and Bastarache Stone Quarrie near Notre Dame.

Nelson Monuments Ltd.

The address for Nelson Monuments Ltd. is P.O. Box 1220, Sussex, New Brunswick E0E 1P0. Telephone: (506) 433-3413.

Nelson Monuments Ltd.—the largest monumental company in Atlantic Canada—has historic links with one of the earliest monument men in New Brunswick, Josiah Tingley. The Tingley family began producing tombstones at Hopewell Cape in 1846 and steadily expanded over the next seventy years, hiring local people as business grew. In 1907, the Tingleys took on two young brothers named Percy and George Nelson. After two years' apprenticeship, the brothers established their own business two miles down the road at Lower Cape; there, they made monuments of native sandstone, and native and foreign granite.

The Nelson enterprise remained a small family operation for about forty years until it passed to George's sons, Maurice and Russell, in the early 1950s. Together, the two men slowly changed the company's entire approach. First, they incorporated as Nelson Monuments Ltd. in 1954. Five years later, they moved from Lower Cape to a new stone finishing plant in Sussex and steadily built the business into the vibrant monumental and quarrying concern it is today.

Part of the Nelsons' strategy was to buy or lease quarry properties across New Brunswick. In this, they had variable success. Between 1957 and the early 1970s, they obtained quarry rights to several lots at Hampstead. These have since proven viable and currently supply 30–40% of all stone used at the Sussex plant. Production consists of the pink Hampstead granite (now designated by the trade name *Coral Dawn*), and averages 200–280 m^3 annually.

In 1962, the Nelsons purchased the Spinney quarry in Charlotte County from Ken Fitzgerald, using its black granite as monumental material and as veneer for store fronts in Moncton and the Centennial Building in Fredericton. In the mid- to late 1970s, they reopened quarries at Dawson Mountain (light pink) and Johnson Lake (black), providing stone from the former site to the Saint John Regional Hospital and other building projects. However, the quarries were not commercially feasible and about 1980 Nelson Monuments ceased all activity in the area.

Today, the Nelsons work quarries at Hampstead (Figure 9:33) and also at Vermillion Bay in northern Ontario. All operations use the flame-jet cutting technology to extract stone whereby diesel fuel and compressed air are combined to produce a very concentrated, high-temperature flame like a blow torch. When applied to rock, the jet causes a narrow section of stone to spall and chip, creating a channel about four inches wide. As well, the quarries feature modern quarry bars, squaring equipment, and front-end loaders. Granite from Hampstead is trucked to the Sussex plant and manufactured into monument bases, streetscaping, curbing, bridge stone, and some veneer stone.

In addition to working stone from Vermillion Bay and Hampstead, the Nelsons import granite from South Africa, India, Norway, Finland and the United States for monumental or decorative purposes. The Sussex plant holds an array of computerized diamond saws, polishing tables and lettering facilities including computer-assisted drafting devices. The company's monuments are bought by clients in New Brunswick, Newfoundland, Nova Scotia, Prince Edward Island, the Gaspé coast, and southern Ontario. Its lettering and distribution plant in Waterloo, Ontario is among the most modern facilities in Canada.

Maritime Stone Works Inc.

The address for Maritime Stone Works Inc. (formerly Bee Stone Company Inc.) is 100 Brennan Ave., Scoudouc, New Brunswick E0A 1N0. Telephone: (506) 533-9384. The company is owned and managed by Fred Pellerin. Website: *www.dorchestersandstone.com*.

Maritime Stone Works Inc. (formerly Bee Stone Company Inc.) has been operating since the late 1980s, supplying a light buff, beige and brown sandstone for both new construction projects and the restoration market from a quarry in Westmorland County of southern New Brunswick. Stone from this quarry and and one adjacent to it probably accounted for exports in the millions of tons during the late 1880s.

To date, Maritime Stone Works Inc. has fulfilled restoration contracts, providing material from the Boudreau quarry (Figure 9: 34) to repair Monument Lefebvre in St-Joseph and stone bridges in Central Park, New York City. The company lists building stone, fireplace stone, landscaping stone, flagstone, retaining wall stone, boulders and stone chips among its product line. It also produces blocks/slabs cut-to-size and carved sandstone, and has supplied clients as far away as San Francisco. Stone for restoration and new construction projects are actively pursued. A few of the projects recently undertaken have included Government House in Halifax, N.S., Old Government House in Fredericton, N.B. and other custom work in Ontario.

Smith Cut Stone and Quarries Limited

The address for Smith Cut Stone and Quarries Limited is P.O. Box 69, Shediac, New Brunswick E0A 3G0. Telephone: (506) 532-6902. Smith Cut Stone the company is managed by Louis R. Drisdelle.

Smith Cut Stone and Quarries (or, more precisely, its antecedents) is the oldest existing stone company in New Brunswick. From the 1860s onwards, the company has been producing dimension stone from its olive green sandstone quarry (Figure 9: 35) as well as from other sources. Smith pursued the building stone market vigorously and within a few years the company secured many contracts to supply trim stone for brick buildings, and dimension stone for major structures across southern New Brunswick and (in one case) Québec.

One of the most highly regarded Acadian stonemasons, Arthur LeBlanc, became the quarry superintendent in 1934. Arthur oversaw stonework on most Smith contracts until well into the 1970s. In 1968, the entire stone enterprise was sold to Arthur's son and was incorporated as Smith Cut-Stone and Quarries Limited. After 1954, the company stopped using stone from its Shediac property and concentrated instead on cutting material from other sources such as Queenston limestone from Ontario, red sandstone from the Pickard quarry in Sackville, and sandstone from Wallace, Nova Scotia. The change occurred for several reasons.

From 1970 to 1980, the late Roy LeBlanc and his employees excavated stone in Sackville, cut it in Shediac, returning it to the Mount Allison University Campus to construct the Roy Crabtree Building. In 1981, LeBlanc leased another red sandstone quarry outside Sackville to supply material for the Confederation Square building in Toronto.

The Smiths' own Shediac quarry has been re-activated once since 1954 in order to supply stone for an addition to Moncton High School that was built of Shediac stone in 1934.

Today, the Smith Cut Stone and Quarries facilities operate on demand. Recent projects have included both restoration and new construction.

Bastarache Stone Quarrie

Bastarache Stone Quarrie [Telephone: 856-9507] operates a sandstone quarry at Notre Dame, north of Moncton in southeastern New Brunswick (Figure 9: 36). Specializing in flagstone, the company has supplied material used as wall and patio stone for windowsills and fireplace hearths as well as general building stone.

Mineral Aggregate

The production of mineral aggregate from bedrock and granular deposits (sand and gravel) is fairly widespread throughout New Brunswick (Figure 9: 37-43). Because of a shortage and variability of pit-run material from many granular sources and the increasing costs of processing required to meet tighter construction specifications, there is an increasing preference toward the use of bedrock or "crushed rock" as a source aggregate materials.

Dozens of small companies and independent contractors extract sand and gravel and related materials from numerous pits that, with few exceptions, are operated on an intermittent-demand basis. While many operations produce low-specification pit-run or borrow material, several companies produce good quality material from large deposits. These are more permanent operations that lie within economical trucking distance of high-demand urban areas.

A bulk of the province's "crushed rock" is produced from ten to fifteen quarries; most are strategically situated near higher-demand centers or areas lacking in quality granular materials.

The 1990s have seen an unprecedented amount of highway and related infrastructure construction underway in New Brunswick. The present focus on upgrading the Province's major highway system(s) has led to considerable interest in locating and developing sources of high-performance mineral aggregate. Such projects have resulted in the establishment of several new strategically positioned pits and quarry at several locations throughout the province.

Apart from meeting increased requirements for the domestic market, the export of mineral aggregate from New Brunswick tidewater locations began in the mid-1990s and continues to gain momentum as a realistic alternative to resource development. Beginning with shipments of sand into the New York area, aggregate export recently has expanded to include bedrock that has been quarried and processed at an industrial park immediately adjacent the port facility at Bayside in southwestern New Brunswick. Combined annual shipments of these materials are probably in the range of 300 000 to 500 000 t and now form a significant part of port traffic at Bayside. Aggregate exports from New Brunswick ports is also being considered by other interests.

HYDROCARBONS

Coal

N.B. Coal Limited

COMPANY N.B. Coal Limited, P.O. Box 520, Minto, New Brunswick E0E 1J0. Telephone: (506) 327-3336. The President is Mr. A. Cormier. The parten company is NB Power.

RIGHTS N.B. Coal Limited holds a Coal Agreement, under the *Mining Act*, Chapter M-4.1, S.N.B. 1985, in the Minto–Chipment area.

LOCATION The Minto–Chipman coalfield (Figure 9: 44) is approximately 60 km east-northeast of Fredericton (NTS 21 I/4, 21 J/1).

HISTORY (For early history see Miscellaneous Report 13, "New Brunswick's Mineral Industry, 1993."

RESERVES 9 600 000 t of coal, proven.

Production 272 173 t of coal (1999); 272 362 t of coal (1998)

Employees 1999–2000, an average of 96 persons, not including 22 contract truckers.

Developments N.B. Coal Limited operates for only 8 months of the year.

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ABBREVIATIONS

cm - centimetre	L - litre
m - metre	M - mega (prefix for 1000000)
km - kilometre	t/a - tonnes per year
g - gram	t/d - tonnes per day
t - tonne	ha - hectare

CONVERSIONS

Square miles (sq. mi.) x 2.589988 = square kilometres (km^2)

Short tons x 0.907184 = tonnes (t)

Acres (ac.) x 0.404685 = hectares (ha)

For precious metals:
ounces per ton (oz./ton) x 34.28571 = grams per tonne (g/t)

For oil (1 barrel = 42 U.S. gallons):
barrels x 0.1589873 = cubic metres (m^3)

For natural gas:
cubic feet (cu. ft.) x 0.02831685 = cubic metres (m^3)

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